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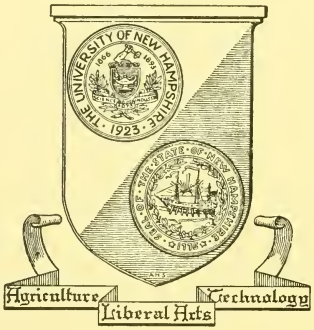

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Marketing New England Poultry

1. Characteristics of the Processing Industry

By

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in cooperation with
Agricultural Experiment Station, University of Massachusetts and Market Organization and Costs Branch, Marketing Research Division, Agricultural Marketing Service, United States Department of Agriculture.

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Preface and Acknowledgements

This bulletin is the first in a new series, to be issued by Agricultural Experiment Stations in the New England States, and involving in most instances direct cooperation with the Agricultural Marketing Service, U.S.D.A. The series will deal with various aspects of poultry marketing in New England. This publication describes the main features of the processing industry, based upon a complete enumeration sample of plants in 24 counties in 4 New England States.

The authors are indebted to the more than 200 poultry processing plant operators, contacted by field survey, who furnished the basic information used in the study. They wish especially to acknowledge the assistance and critical appraisal received from the Agricultural Economics Departments of the Universities of New Hampshire and Massachusetts; and from Norris T. Pritchard, Market Organization and Costs Branch, Marketing Research Division, Agricultural Marketing Service, United States Department of Agriculture, Washington, D. C.

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Marketing New England Poultry

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By

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Edwin T. Bardwell*

I. Objectives and Methods of Study

MARKED changes have taken place in the poultry industry in New England and in the United States since 1940. Technological advances in production, processing and packaging, transportation, and marketing enabled the industry to expand, and contributed immeasurably to alteration of its structure and operations. A steadily decreasing price relative to other foods, increasing consumer incomes, more rapid movement of the product to the retail level, more uniformity of product, and greater convenience and variety offered the shopper have facilitated consumption of the expanded output.

In most respects processing has been the most dynamic segment of the New England poultry industry in the post-war era and its influence on other segments has been great. This report, a cooperative study by the Agricultural Marketing Service, U.S.D.A., and the New Hampshire and Massachusetts Agricultural Experiment Stations, describes processing in various sections of New England and the functions directly associated with the processing enterprise. Later reports will develop more fully the prospects for more efficient use of resources in all segments of the industry.

The recent growth and development of the New England processing industry have been associated with:

(1) A relative and absolute decline in long-distance movements of live poultry and in the role of the independent live buyer as a sales outlet for producers;

(2) Expansion of large-scale dressing operations at country points and the decline of slaughtering in cities;

(3) Increased specialization in certain areas in commercial meat chicken production, larger average size of producing units, and declining numbers of small producing units;

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(4) Vesting of increased control over volume and practices in the hands of processors, feed companies, hatcheries, and a few large independent contractors, fewer independent producers, and expansion of producer financing by other than traditional lending agencies;

(5) Movement of eviscerating and cut-up operations toward country points and out of wholesale and retail establishments;

(6) By-passing of traditional wholesale channels toward a more important role for chain store organizations, packer branches, and direct-to-store delivery by nearby processors;

(7) Narrowing of the effective competitive role of the small processor, suggesting greater orientation toward supplying local markets;

(8) Increased doubts about the validity of established market price quotations for widespread use.

To identify the area and plant size characteristics of the poultry processing industry, 24 of the 67 counties in New England were selected for study. The sample was designed to include areas where production was commercial, semi-commercial, and non-commercial in type, and to account for variations due to distance from major consuming centers, surplus-deficit status, and relative proportions of young and mature birds available for processing.

Information initially available relative to the numbers and importance of plants of different sizes was inadequate to permit size stratifications. Hence, an effort was made to secure a 100 percent sample of units within the 24 counties to furnish data on this point. Study of a large number of plants was also required to determine degrees and types of integration, extent and reasons for overcapacity, and differences in trading areas, types of suppliers and buyers, equipment, practices, and efficiency with various plant sizes.

II. Area and Plant Size Characteristics

The commercial poultry meat industry in New England is based largely on chicken broilers and fryers. But an appreciable part of the total supply of poultry meat consists of heavier birds, such as fowl, roosters, and roaster-type young birds, as well as turkeys. Some plants concentrate on broilers or fowl, using other classes to supplement supplies of the major item. Since supplies of fowl are more seasonal, plants concentrating on fowl may reach out considerable distances for supplies and/or handle relatively large volumes of young chickens. Broiler plants, particularly in commercial areas, may find volume steady and not be interested in processing fowl.

Poultry production in New England is not evenly distributed either in type or quantity. The major commercial areas are central Maine, eastern Connecticut, southeastern New Hampshire, and eastern Massachusetts. In the first two areas, commercial meat chicken predominates; in the latter, market and hatching eggs. In most other areas, production is small and scattered. Concentrations of large-sized processors occur in the areas of commercial poultry production, with little or no commercial processing in the areas of light production.

The structure of the marketing system in particular areas is altered by the contiguity to or remoteness from major markets. This is principally reflected in the relative importance of the live poultry trade and the degree of distribution by processing plants to jobbing and retail outlets. Areas contiguous to major markets exhibit a large amount of live poultry buying.

In remote areas, if commercial, birds are likely to be processed for distant markets; and if the area is non-commercial, a substantial share of the small volume may be processed by small local units and absorbed by local consumer demand.

Both consumer demand and market demand in relation to production affect the marketing system. One aspect of demand and supply involves the quantity consumed in the area. On this basis it is evident that remote commercial areas will be surplus and contiguous non-commercial areas will be deficit. Other areas will be either surplus or deficit depending on the quantities needed for consumption and actually produced. Deficit areas will tend to prepare poultry for local use; surplus areas for shipment to more distant markets. A second aspect of demand and supply involves the processing capacity and/or the live buying capacity in the area. These provide a more direct and effective demand for local birds than does consumer demand. In many cases they are not derived to any great extent from the local consumer demand, especially in areas removed from the main markets.

Description of Sample Areas

For summary purposes, the 24 counties surveyed were consolidated into 6 areas on the basis of degree of commercialization of production, distance from major markets, surplus-deficit status, and ratio of broilers to farm chickens.*

*For data applicable to individual counties see Appendix Table II.

Area 1

Although Aroostook County, Maine, and Coos County, New Hampshire, are widely separated they are essentially alike with respect to poultry production and processing. The main agricultural enterprises are potatoes in Aroostook County and dairying in Coos County. Poultry production is relatively unimportant. Hence, these counties are non-commercial in poultry production, and processing is performed largely to supply local markets. Both counties are remote from major consuming centers; both are deficit in poultry meat. The limited amount of poultry meat produced comes almost entirely from the sale of cull fowl and young chickens raised in conjunction with laying flock replacement programs. Poultry moves southward out of these counties in live form via live buyers and processing plant collection, and into these counties in processed form.

In these two counties, slaughter is about a fourth of the small volume available. All processors of chickens in Area 1 have very small volumes. Many are either producer-processors or former producers engaged in limited processing.

Area 2

Androscoggin, Kennebec, Knox, Lincoln, Sagadahoc, and Waldo counties of Maine contain most of the large processing plants in the state, among which are several of the newest and largest in New England. This area, plus portions of adjacent counties account for most of Maine's production of commercial meat chickens. Several of these counties are also important in egg production and are important sources of fowl and related market classes. Poultry production is of major importance in the agriculture of the area. This area is highly commercialized, and heavily surplus. Since it is remote from major consuming areas, the large processing industry is organized for supplying distant volume outlets. Commercial meat chickens are much more important than fowl and other "farm chickens".

The volume of poultry produced and processed in central Maine has increased substantially in recent years. Significant shifts in industry practices have occurred (Table 1). Central Maine, among the commercial and semi-commercial groupings, has moved relatively further toward an eviscerated product than other areas. This trend is continuing and is also proceeding rapidly in other areas of New England. The largest Maine plants, and most of the large plants in other areas, are concentrating more and more on broilers and fryers and other young chickens. Contract growing has expanded rapidly in most areas where commercial meat chickens are important. In Maine this has appeared almost entirely as direct contracting by the processing firms (or their affiliates). In other areas, processing firms have done less direct contracting, though contract growing and various financial arrangements between feed companies, hatcheries, and other agents, and growers are in widespread use.

Slaughter in central Maine plants exceeds the volume available in the sample counties. The larger plants in this territory have many growers in the adjacent counties of Penobscot, Hancock, Piscataquis, Somerset, Franklin, Oxford, and Cumberland.

Area 3

Belknap, Hillsboro, Merrimack, Rockingham, and Strafford counties in southeastern New Hampshire contain all of the sizable processing plants in the state. Poultry production is about equally important with dairying. This

Table 1. Central Maine: Changes in Selected Practices 1951 to 1955-56

Feature	1951		1955-56	
% of Sales in N. Y. Dressed Form		95		35
% of Slaughter, by Market Classes:				
Broilers		87		79
Fowl		12		6*
Chickens		1		15†
% of Supplies from Contract Growers		62		92
Location of Market Outlets, % Distribution‡				
	New York and Connecticut	71	Over 200 Mi.	47
	Massachusetts	17	100-200 Mi.	43
	Maine	9	50-100 Mi.	9
			Under 50 Mi.	1
Types of Buyers, % of Volume	Commission men and wholesale receivers	91	Wholesalers	81
			Chain Warehouses and packer branches	19

* Fowl and roosters.
† Heavy young chickens.
‡ Intervals associated with state lines and distances from plant not strictly comparable.

area accounts for the bulk of the state's market and hatching egg flocks. Interspersed is a substantial output of commercial meat chickens. Hence, this area is important in the production and processing of fowl and related classes, with commercial meat chickens a supplementary contribution to plant volume. While Rockingham and Hillsboro counties are moderately commercialized, the other three counties are semi-commercial; thus, in total the area can best be described as semi-commercial and surplus. It is intermediate in distance from major consuming areas. This area processes more fowl than any other in New England. Sales to volume outlets in markets outside the area are stressed. It is still an important territory for live buyers.

Plants in southeastern New Hampshire and in eastern and central Massachusetts compete for poultry across their respective state lines and in some instances in portions of Vermont and southern Maine. Maine, New Hampshire, and Massachusetts are important suppliers of live poultry for the Boston market and live poultry from these states also moves to the New York City area. In balance, there is a net out-movement of live poultry from Areas 3 and 4.

Area 4

The Bristol, Middlesex, Norfolk, Plymouth, and Worcester county area in Massachusetts is a heavily populated and industrialized section. The area is, in total, heavily deficit and contains large consuming centers. Yet agriculture is important in these counties and poultry production shares major importance with dairying. The area is important in market and hatching egg production. Commercial meat chickens are relatively more important to processing plant volume than in southeastern New Hampshire. The area can best be described as moderately commercialized. It contains most of the large processing plants in the state plus a substantial share of the medium-sized and small units. Because of the proximity to major consuming centers, considerable stress is placed on direct distribution to retail and jobbing outlets. It is still an important territory for live buyers.

Area 5

New London, Tolland, and Windham counties in eastern Connecticut contain most of the state's commercial meat chicken production plus a substantial share of the output of fowl and related classes derived from market and hatching egg flocks. Commercial meat chickens are of major importance, though fowl and related market classes are relatively more important to processing plant volume than in the central Maine area. Most of the larger processing plants in the state are in this area. As is true in Central Maine, small plants are unimportant. Poultry production exceeds dairying in importance. These counties are highly commercialized and heavily surplus. They are intermediate in distance from major consuming areas. Some stress is placed on direct distribution to retail and jobing outlets, but not to the same degree as in eastern and southeastern Massachusetts.

In the commercial area of eastern Connecticut slaughter is substantially less than the volume available for slaughter. This area still supplies an important volume of live poultry to the New York City area.

In 1948, the volume of live poultry from Connecticut sold through the New York City Live Poultry Terminal was 26.1 million pounds. In that year, Connecticut supplied more live poultry to New York than any other state. The volume of live poultry now being supplied by Connecticut producers to the New York market is not known, but it is believed that their locational advantage has enabled them to maintain their competitive position on the live market.*

In 1948, the seven leading states supplying live poultry to New York were Connecticut, New York, Delaware, Pennsylvania, New Jersey, Massachusetts, and Maine.† In 1950, Metropolitan New York was the single largest market for Connecticut live poultry, with 47 percent of the total being shipped there. Connecticut markets were second with 36 percent, Massachusetts third with 16 percent, and Rhode Island least important with one percent.‡

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* Morrison, T. C., Relation of the Chicken Meat Industry in Connecticut to the N. Y. City Market for Dressed and Live Poultry. University of Conn. Extension Service Leaflet 47, August 1953, p. 5-6.

† Zwick, C. J. and R. A. King, Competitive Position of the Connecticut Poultry Industry: 5. The Economic Advantage of Location in Marketing Live Poultry. Storrs Agricultural Experiment Station Bulletin 293. September 1952, p. 5.

‡ Zwick, C. J. and R. A. King, Markets and Marketing Facilities for Connecticut Live Poultry, Storrs Agricultural Experiment Station, Inf-19. October 1950, p. 7.

The Hartford-Springfield area, which in this study consists of Hampden County, Massachusetts, and Litchfield and Hartford counties, Connecticut, is heavily populated and industrialized. It is contiguous, though only slightly deficit. Because of the large volume of commercial meat chickens produced in Hampden County the area is about self-sufficient in these classes, and only slightly deficit in the production of fowl and related market classes. Dairying is of equal importance with poultry production. Hampden County is commercial; Hartford County semi-commercial; Litchfield County non-commercial; on balance the sample area can best be described as semi-commercial. The area is able to draw upon supplies from eastern Connecticut as well as on certain other nearby counties of Connecticut and Massachusetts. The area contains a few large and medium-sized plants and many small plants. Slaughter in this area greatly exceeds the volume produced within its boundaries.

Summary of Plant Size Characteristics

Many features of the poultry processing industry in New England are more clearly associated with unit size than with location. Others are explained in part by each. All processors are competitive in the sense that they share in the total supply of, and consumer demand, for poultry. Yet the direct and effective competition between very large and very small plants in a given area may be limited. These extremes procure birds from different sources and market them through different outlets. From the lower to the higher extremity, there is likely to be a gradual but irregular transition in characteristics and in the degree of direct competition. Included among the tools of competition, in addition to basic prices, are services, and a whole group of intangibles, such as, objective and subjective measures of quality, personal contacts, and social groupings.

The several forms of integration which occur in the industry are related to either plant size or the evolution of the individual firm. These may be defined as follows:

A. Horizontal, processing. Several plants operated by one formal structure of management.

B. Horizontal, multiple-commodity. Poultry, eggs, and other items produced and/or handled by the same unit at the same level in marketing channels.

C. Vertical or multiple-function. Growing, assembling, processing, distributing, feed mixing and sales, equipment and supplies sales, and financing handled by one formal or informal management group.

In New England horizontal integration in processing is almost totally absent. Informal arrangements, based on family ties or common sources of financing, may exist. These are likely to involve medium or large-sized units. Many smaller units handle eggs, particularly when jobbing or retailing is involved. Some of the large cooperative processors originated as handlers of eggs and/or live poultry, with the poultry processing operations succeeding the handling of live birds.

Many small processors are engaged in growing and in retail distributing. Many large processors engage in breeding, hatching, financing, contract

growing, and/or handling feed and supplies. Contract growing may be carried out directly by processors or by secondary contractors under working arrangements.

The movement of processing toward the country, and the accompanying de-emphasis on the long-distance movement of live poultry, have resulted in excess plant capacity in or near major markets. Many units, particularly in the very small, small, and medium-sized groups, and plants specializing in fowl, still experience considerable seasonal variations in volume. In commercial areas, where volume is concentrated in relatively few hands, overcapacity occurs as an element of monopolistic competition.*

Smaller processing units tend to concentrate buying and selling activities within a smaller radius from the processing plant, with larger units reaching farther for the residual share of supplies and serving more distant markets. Smaller processing units are also likely to deal with smaller producing and purchasing units, suggesting in the latter instances a substantial degree of retail distributing.

With the types of processing equipment currently available, most smaller units operate without overhead conveyor lines. When this occurs, a series of hand operations is required in scalding, picking, etc. Larger units, whose volume justifies overhead lines and automatic equipment, are able to eliminate much hand labor.

Substitution of equipment for labor will increase the output per man hour as plant size increases. Because of less variation in volume, larger plants can readily operate at a higher percentage of theoretical capacity. This may appear as a rather sharp rate of increase in part because smaller operators may elect to devote a share of given resources to assembling and retail distribution if they maximize total returns.

Table 2 summarizes some of the salient features of poultry slaughtering plants of various sizes contacted by field survey in 24 New England counties. Details related to many of these points are presented in subsequent pages.

Available Supplies and the Volume of Slaughter in Sample Areas

The volume of chickens available for slaughter in the sample areas in 1955 was about 74 percent of the New England total. Slaughter by units contacted was about 70 percent of New England production. Data on chickens available for slaughter by areas were obtained by apportioning AMS state data on broilers produced and chickens sold on the basis of 1954 Census numbers by counties. The low correlation between county volume of slaughter and supplies available can be largely explained by the following:

A. Inadequacy of the county as an economic unit, especially as a supply area.

B. Variations due to under-enumeration, particularly of small slaughtering units.

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*This term is used in the sense that Chamberlin does to define a situation where a number of firms share the market for (or supply of) a particular product but "each is in some measure isolated, so that the whole is not a single large market of many (firms), but a network of many markets, one for each (firm)." *The Theory of Monopolistic Competition*, Harvard University Press. This concept is appropriate for the poultry meat industry because firms are relatively few and have special relationships with producers due to location, procurement, and contract provisions; yet competition for supplies and outlets is rather vigorous.

Table 2. Characteristics of Poultry Slaughterers, According to Size (Volume of Slaughter)

Annual Volume (1,000 Pounds)	Number of Units Contacted	Typical Processing Equipment	Predominant Types of Businesses	Areas Where Mostly Located	Relative Importance of Various Market Classes	Percent of Slaughter Sold as Eviscerated and Cut-up	Percent of Volume Going to Major Outlets	Extent of Direct Contract Growing by Plant
Less than 150 (very small)	160	Hand operations to manual pickers and scalders	Producers; poultry and egg stores	Close to or in areas of concentrated population	Heavy young chickens and fowl, more important than broilers and fryers in all areas	64	63% to consumers and 25% to stores	None
250-1,100 (small)	19	Manual pickers and scalders, few partial powered lines	Small processors; a few live dealers	Central Maine; S.E. New Hampshire; E. and S.E. Massachusetts, Hartford-Springfield area	Fowl and heavy young chickens more important than fryers, except Hartford-Springfield area	12	40% to wholesalers, 31% to stores, and 16% to chain warehouses and packer-branches	Negligible
2,000-8,000 (medium)	12	Over-head lines	Medium-sized processors	S.E. New Hampshire; E. and S.E. Massachusetts, E. Connecticut; Hartford-Springfield area	Broilers and fryers most important except S.E. New Hampshire	25	67% to wholesalers, 17% to stores	Minor
11,000 and over (large)	13	Over-head lines	Large processors	Central Maine; E. Connecticut; S.E. New Hampshire; E. and S.E. Massachusetts; Hartford-Springfield area	Broilers and fryers most important except S.E. New Hampshire	39	68% to wholesalers, 23% to chain warehouses and packer-branches	Important

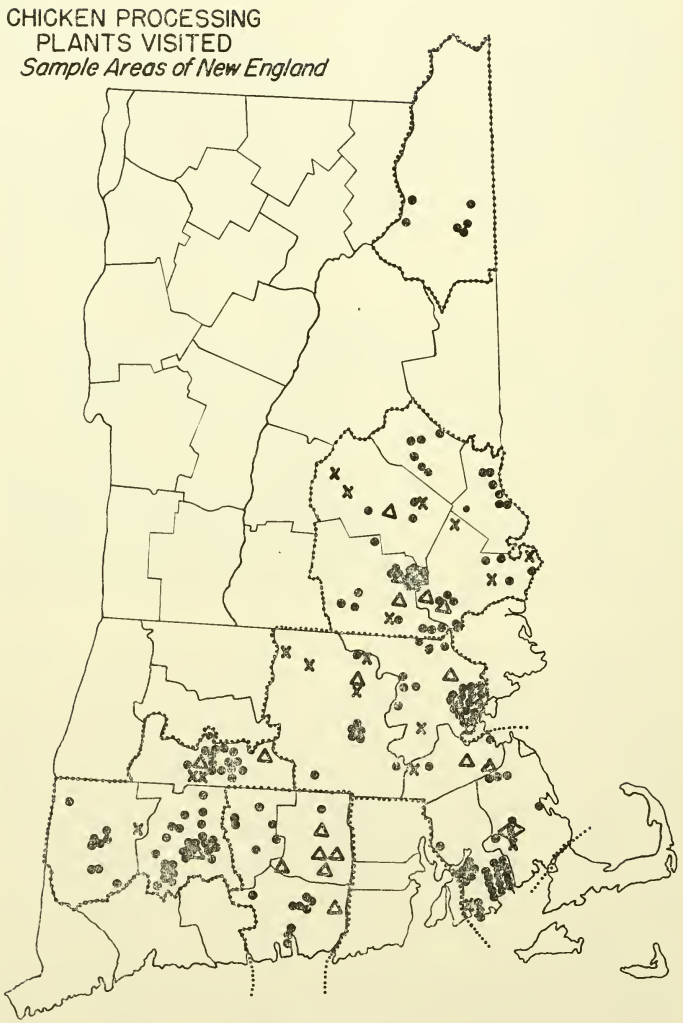
CHICKEN PROCESSING
PLANTS VISITED
Sample Areas of New England

Figure 1A

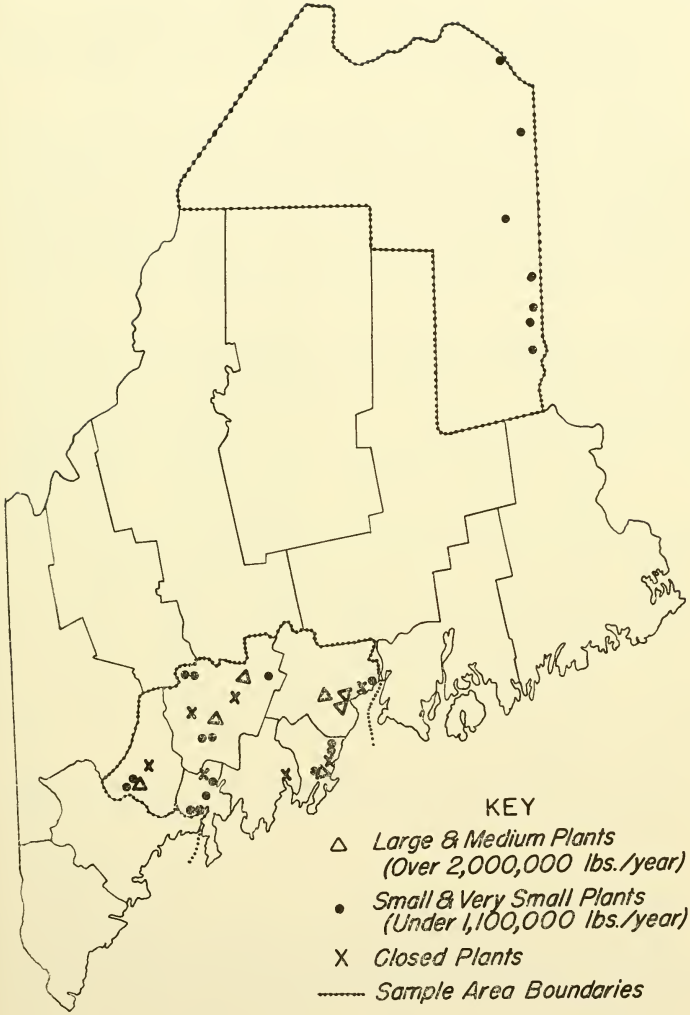
KEY
Large & Medium Plants
(Over 2,000,000 lbs./year)
Small & Very Small Plants
(Under 1,100,000 lbs./year)
Closed Plants
Sample Area Boundaries

Figure 1B

C. Out-movements and in-movements of live poultry.

D. Large plants, which dominate volume statistics, tend to ring a supply area rather than to cluster at its center. With such dispersion many plants compete equally in some sections, but have a small buying advantage in others.

Twenty-five slaughtering plants in the medium and large groups are located within the sample areas. Secondary data suggest that there are probably no more than a half-dozen additional plants in these size groups in the remainder of New England, but that the additional number of small and very small processing plants is probably substantial. Hence, there is likely to be a net out-movement of live poultry in most sections not surveyed except in the more heavily populated areas. The extensive listings of live buyers, and their home addresses, maintained by the various state departments of agriculture in New England, support this premise.

Table 3. Slaughter and Evisceration: Number of Units and Volume in Relation to Supplies Available for Slaughter by Areas

Area	Number of Units Contacted Which			Estimated Available for Slaughter*	Reported Slaughter*	Estimated Net-Movement for Slaughter* Out + or in —	Reported Eviscerated by Slaughtering Units	Reported Other Evisceration†
	Slaughtered Only	Slaughtered and Eviscerated	Eviscerated Only					
				(Million Pounds of Chicken)				
1	13	10	0	1.1	0.3	+0.8	0.2	—
2	19	15	2	100.7	115.6	—14.9	73.8	2.4
3	41	21	5	39.0	32.5	+6.5	1.0	2.9
4	59	34	11	51.5	44.9	+6.6	9.2	1.7
5	22	19	0	88.9	64.5	+24.4	14.9	—
6	50	48	2	29.3	35.8	—6.5	10.9	‡
Total	204	147	20	310.5	293.6	+16.9	110.0	7.0

* Live weight basis.

† Does not include evisceration in wholesale channels, in retail food stores or affiliated chain units, or by final user (hotels, restaurants, etc.; and consumers). Dressed weight basis.

‡ Less than 100,000 pounds.

Number of Plants and Plant Size

Within the 24 New England counties in the sample areas, 204 slaughtering plants and 20 plants which eviscerated, but did not slaughter, were contacted. Data relative to separate eviscerating plants are presented in a later section.

Slaughtering units fell into four groups, with an absence of units of intermediate size, as follows:

1. *Very Small.* Annual slaughter less than 150,000 pounds, live weight, and peak slaughter less than 3,000 pounds, live weight, per week.

2. *Small.* Annual slaughter between 250,000 and 1,100,000 pounds, live weight, or peak slaughter of 3,000 pounds or more, live weight, per week.
3. *Medium.* Annual slaughter between 2,000,000 and 8,000,000 pounds, live weight.
4. *Large.* Annual slaughter of 11,000,000 pounds, and over, live weight.

Of the 204 units contacted, 44, classified as small, medium, and large accounted for 98 percent of recorded slaughter. These same units accounted for 97 percent of the volume of chickens eviscerated in the same plants, and 99 percent of the volume of broilers and fryers, 93 percent of the volume of heavy young chickens, and 96 percent of the volume of fowl and roosters slaughtered. Generally, very small units eviscerated a substantially higher percentage of their slaughter than other size groups.

Areas 1, 2, and 5 have considerably fewer units than Areas 3, 4, and 6, yet Area 1 lies at one extreme in terms of total volume and Areas 2 and 5 at the other. Areas 4 and 6 are the most heavily populated and have larger numbers of poultry and egg stores and other types who process. Area 3, together with Areas 4 and 6, shows a relatively large number of producer-processors, generally oriented toward fowl and heavier classes of chickens.

The average size of slaughtering units, by areas, can be calculated from Table 4. In Area 1, the average unit slaughters less than 25,000 pounds

Table 4. Number of Slaughtering Units Contacted, by Size Group and Area

Area	Size Group					Total Small, Medium, Large
	Total	Very Small	Small	Medium	Large	
	(Number of Units)					
1	13	13	—	—	—	0
2	19	10	3	0	6	9
3	41	30	6	4	1	11
4	59	48	6	3	2	11
5	22	16	0	3	3	6
6	50	43	4	1	2	7
Total	204	160	19	11	14	44
% of Units Contacted	100.0	78.4	9.3	5.4	6.9	21.6
% of Reported Slaughter	100	2	3	13	82	98

annually. In Areas 3, 4, and 6, average annual slaughter per plant is between 700,000 and 800,000 pounds; in Area 5, almost 3 million pounds; in Area 2, over 6 million pounds.

All of the slaughterers in Area 1 are in the very small grouping. Eighty percent of the units in Areas 4 and 6 are very small, largely because of the number of poultry and egg stores. In Areas 3 and 5, 75 percent of the units are very small, while in Area 2 only half of the units are very small.

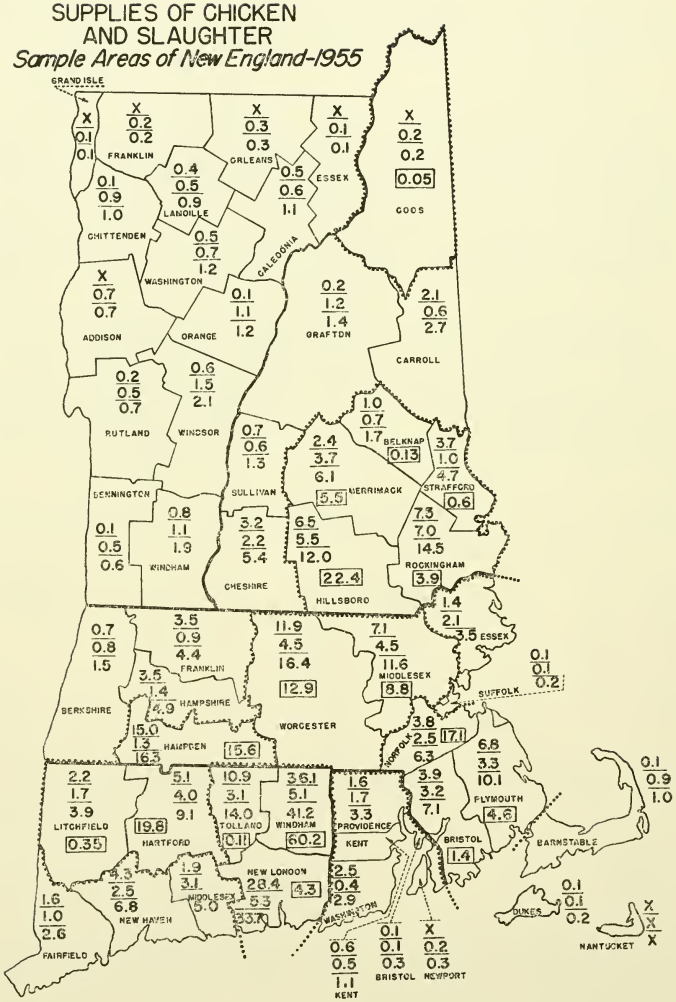
SUPPLIES OF CHICKEN
AND SLAUGHTER
Sample Areas of New England-1955
GRAND ISLE
FRANKLIN
ORLEANS
ESSEX
COOS
CHITTENDEN
LAMOILLE
CALEDONIA
WASHINGTON
ADDISON
ORANGE
GRAFTON
CARROLL
RUTLAND
WINDSOR
BELKNAP
STRAFFORD
SULLIVAN
MERRIMACK
BENNINGTON
WINDHAM
CHESHIRE
HILLSBORO
ROCKINGHAM
ESSEX
FRANKLIN
MIDDLESEX
SUFFOLK
BERKSHIRE
HAMPSHIRE
WORCESTER
HAMPDEN
NORFOLK
LITCHFIELD
HARTFORD
TOLLAND
WINDHAM
PROVIDENCE
KENT
BRISTOL
PLYMOUTH
BARNSTABLE
NEW LONDON
MIDDLESEX
NEW HAVEN
WASHINGTON
DUKES
NANTUCKET
FAIRFIELD
BRISTOL
NEWPORT
KENT

Figure 2A

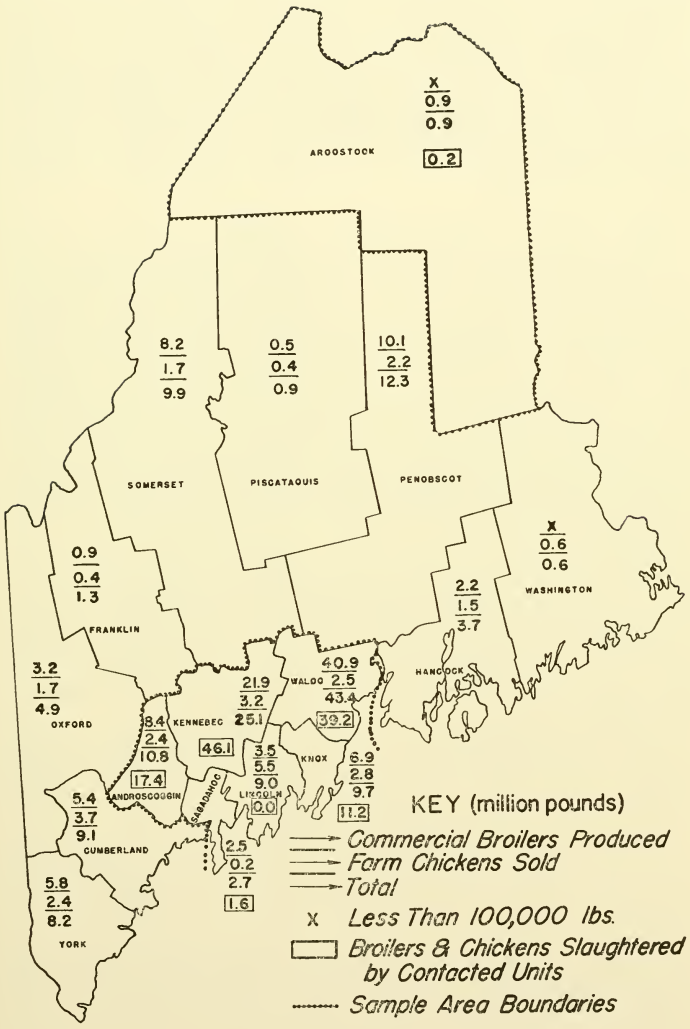
AROOSTOCK
X
0.9
0.9
0.2
8.2
1.7
9.9
0.5
0.4
0.9
10.1
2.2
12.3
SOMERSET
PISCATAQUIS
PENOBSCOT
X
0.6
0.6
WASHINGTON
0.9
0.4
1.3
FRANKLIN
2.2
1.5
3.7
3.2
1.7
4.9
OXFORD
40.9
WALDO 2.5
43.4
HANCOCK
21.9
3.2
25.1
8.4
2.4
10.8
17.4
KENNEBEC
46.1
39.2
3.5
5.5
9.0
KNOX
6.9
2.8
9.7
11.2
5.4
3.7
9.1
ANDROSCOGGIN
SAGADAHOC
LINCOLN
0.0
CUMBERLAND
2.5
0.2
2.7
1.6
5.8
2.4
8.2
YORK
KEY (million pounds)
Commercial Broilers Produced
Farm Chickens Sold
Total
X Less Than 100,000 lbs.
Broilers & Chickens Slaughtered by Contacted Units
Sample Area Boundaries

Figure 2B

This difference is attributable to a greater concentration of population in Areas 3 and 5, which tends to mean more producer-processors and other retailer-oriented types.

If we eliminate the effects of these 160 very small units, and consider the remaining three categories, comparing small vs. medium and large units, Areas 2 and 5 are typified by more medium and large units than Areas 3, 4, and 6. In these three areas, as well as in central Maine, the small units are definitely oriented toward fowl and heavy young chickens. In Area 3, even the medium and large plants are oriented toward fowl to a greater degree than elsewhere.

Types of Units

Definite relationships exist between area characteristics and relative numbers of different types of processing units. Near larger cities, as well as in non-commercial areas and in areas where egg production is important, many producers slaughter for the local retail and jobbing trade. In highly-commercialized and surplus regions like Areas 2 and 5, where commercial meat chickens dominate the supply picture, producer-processors were relatively fewer in number than in certain other areas. In Area 1, which is remote and non-commercial, most processors were either producers or former producers engaged in small-scale processing. In Areas 4 and 6, where resident populations are large, many producers seek to take advantage of the excellent opportunities for retail selling. In these areas, as in Area 3, as previously noted, many of these producer-processors are seeking retail outlets for cull fowl and heavier classes of chickens, primarily from egg enterprises.

Poultry and egg stores, and to some extent live buyers, cater to the Kosher trade and to other ethnic groups wishing to purchase or select live birds at the point of slaughter. These types of processors tend to be most numerous in heavily-populated areas. Urbanization, zoning, and changing consumer habits have contributed to a decline in the number of poultry and egg stores which slaughter. The effects of zoning are particularly evident in towns near Boston. Many of the remaining units still eviscerate on the premises.

Included in the "other" category in Table 5 are live buyers, locker plants, retail food stores, restaurants, and custom processors who slaughter and/or eviscerate. Not included are many specialized poultry stores in retail shopping centers and a large number of stands and restaurants preparing birds for sale in cut-up, barbecued, or cooked form.

The "processor" group includes a dwindling number of city establishments which supply slaughtered and/or eviscerated poultry to poultry and egg stores (Kosher and non-Kosher) and other types of enterprises which are oriented toward retail selling. Also included are various sizes of country plants.

Of the 204 slaughtering establishments contacted during the survey, 152 were producers, poultry and egg stores, or "other" types. These plants handled only 2 percent of the total volume handled by all plants. While secondary data indicate the survey under-enumerated such units, the adjusted data in Appendix Table III indicate that 217 such units out of a total of 269 (or 81 percent) probably handle less than 3 percent of total volume slaughtered in the sample areas. Thus, the 52 establishments classified as primarily processors would account for more than 97 percent of slaughter.

Table 5. Number of Slaughtering Units Contacted by Type and Area, and Proportions of Volume Slaughtered

Area	Number of Units by Primary Type of Business					Percent of Slaughter by Primary Type of Business			
	Total Contacted	Producers	Poultry and Egg Stores	Processors	Others*	Producers	Poultry and Egg Stores	Processors	Others*
1	13	10	0	2	1	76.4	—	21.7	1.9
2	19	5	1	10	3	0.1	†	99.8	†
3	41	18	4	15	4	1.0	0.5	98.2	0.3
4	59	12	26	13	8	1.0	1.9	95.1	2.0
5	22	8	6	6	2	0.3	0.2	99.4	0.1
6	50	21	19	6	4	2.6	3.1	92.6	1.7
Total	204	74	56	52	22	0.7	0.8	97.9	0.6

* Live buyers, locker plants, retail food stores, restaurants, custom processors.
† Less than 1/10 of 1%.

Further examination of the data in Table 5 and Appendix Table III suggests that only in non-commercial areas, where producer-processors dominate, and in heavily-populated areas, where producers, poultry and egg stores, and "other" types are numerous, would the role of processors be noticeably lessened. However, in Areas 4 and 6, which meet the latter conditions, the proportion of slaughter accounted for by such groups would not reach 8 percent in either area.

Relative Importance of New York Dressed and Eviscerated Poultry

Out of a total of 204 units contacted which slaughter poultry, 147, or over 70 percent, also eviscerate. Of the latter, some also cut up poultry. In total, however, only 37 percent or 110 million pounds of their volume of slaughter is further processed into eviscerated and/or cut-up form. A higher percentage of units in Areas 1, 2, 5, and 6 eviscerate than in Areas 3 and 4. Evisceration by 20 non-slaughtering units, some of which handle poultry from outside New England, totaled only 7.0 million pounds, dressed weight basis.

Of 110 million pounds of chicken eviscerated in slaughtering units, about two-thirds was done in Area 2 plants. Thus, 64 percent of the Area 2 slaughter was eviscerated in the same plants, compared with 86 percent in Area 1, 20-30 percent in Areas 4, 5, and 6, and only 3 percent in Area 3. This indicates that the commercial areas of Maine have moved closer to full country evisceration than other areas where slaughter is substantial (Table 6). Central Maine's large plants eviscerated a higher percentage of

Table 6. Slaughter and Evisceration: Relative Importance by Areas and Plant Size

Area	Annual Slaughter* (1,000 Pounds)	Percent of Slaughter Eviscerated by Same Plants	Percent of Total Slaughter	Percent of Total Evisceration
1	263	86	†	†
2	115,527	64	40	67
3	32,533	3	11	1
4	44,912	20	15	8
5	64,532	23	22	14
6	35,842	30	12	10
Size Group				
Very small	5,717	64	2	3
Small	8,108	12	3	1
Medium	37,297	25	13	9
Large	242,487	39	82	87
Total	293,609	37	100	100

* Live weight.
† Less than 1%.

their slaughter than large plants in other areas. Very small units in all areas are likely to eviscerate a higher percentage of their volume than small or medium-sized plants. Where slaughter of fowl is particularly important, as in very small to medium-sized plants in central Maine, Massachusetts, and in all plants in southeastern New Hampshire, the proportion eviscerated is significantly lower than where broiler and fryers and heavy young chickens are of major importance.

Conclusions reached by classifying slaughtering plant data according to unit size, are roughly paralleled by grouping data from separate eviscerating operations by unit size. The 16 smallest units accounted for 6 percent of the volume, the 5 units in the middle group for 20 percent, and the 3 largest units for 74 percent. Broilers and fryers tended to increase in importance with plant size; other classes combined, to decrease.

Market Classes Slaughtered

Areas 2 and 5 combined accounted for almost 70 percent of the aggregate slaughter of broilers and fryers in the six areas studied. Area 2 accounted for almost half of the heavy young chickens. Area 3 accounted for a third, and Areas 2, 4, and 5 for 17-20 percent each of the fowl and roosters slaughtered.

Broilers and fryers were the major market class slaughtered in all areas except 1 and 3. In Area 1 slaughter of broilers and fryers was negligible with fowl and roosters the main class at 76 percent of the slaughter. In Area 3, also, fowl and roosters were the main class, accounting for 49 percent of the slaughter; broilers and fryers were of second importance at 40 percent. About 80 percent of slaughter in Areas 2 and 5 consisted of broilers and fryers, with heavy young chickens second in importance (at 14 percent) in Area 2 and fowl and roosters (at 14 percent) in Area 5. Fowl and roosters were also relatively more important than heavy young chickens in Area 4.

On the average, almost 30 percent of the slaughter of smaller units consists of heavy birds, such as fowl, roosters, roasters, caponettes, capons, and pullets. Through such concentration, smaller plants are able to offset in part through poundage the advantage of larger plants with respect to the number of head handled per man hour. Except in areas where market and hatching egg production are the major poultry enterprises, medium-sized and large plants tend to specialize on broilers and fryers. Many larger plants do not want fowl and related classes of poultry. They frequently confine slaughter of such poultry to their own supply flocks, working these in one day a week, and are inclined to discount prices on additional offerings.

The proportion of slaughter of broilers and fryers increased with plant size, and the proportion of heavy young chickens declined. Slaughter of fowl and roosters constituted a substantially larger share of the slaughter of very small, small, and medium-sized plants than was true for large plants.

The major item slaughtered by very small units in Areas 1 and 2 was fowl and roosters; heavy young chickens in Areas 4, 5, and 6; broilers and fryers in Area 3. Small units slaughtered relatively more fowl and roosters than other classes in Areas 2 and 3; heavy young chickens in Area 4; and broilers and fryers in Area 6. Broilers and fryers were the major class slaughtered by medium-sized and by large plants in all areas except 3. In Area 3, in total, fowl were of equal importance with broilers and fryers, though each was the major item for certain plants.

Table 7. Market Classes Slaughtered: Relative Importance by Area and Plant Size

Area	Percent of Area or Plant Size Total				Percent of Aggregate Slaughter		
	Broilers and Fryers	Heavy Young Chickens	Fowl and Roosters	Total	Broilers and Fryers	Heavy Young Chickens	Fowl and Roosters
1	*	24	76	100	*	*	*
2	79	14	7	100	44	47	17
3	40	11	49	100	6	10	33
4	65	13	22	100	14	16	20
5	81	5	14	100	25	9	18
6	65	19	16	100	11	18	12
Total	71	12	17	100	100	100	100
Plant Size							
Very small	22	42	36	100	1	7	4
Small	22	32	46	100	1	7	7
Medium	61	10	29	100	11	11	22
Large	75	11	14	100	87	75	67
Total	71	12	17	100	100	100	100

* Less than 1%.

Supply Sources

Direct contracting arrangements account for 90 percent of volume slaughtered by central Maine plants. Direct contracting is also significant in Areas 4 and 5. Contractors (other than processing plants) play an important role in Areas 3, 4, and 6, on the basis of data shown. However, the data shown under "contractors" (Table 8) do not provide an inclusive

Table 8. Supply Sources: Percentage Distribution of Slaughtered Output

Area	Raised	Contracted	Contractors	Independent Producers	Live Buyers	Total
1	79	—	—	21	—	100
2	*	90	2	8	*	100
3	2	*	12	59	27	100
4	1	21	25	45	8	100
5	*	8	3	87	2	100
6	2	—	32	63	3	100
Total	1	40	11	43	5	100
Plant Size						
Very small	35	—	—	46	19	100
Small	7	4	2	66	21	100
Medium	—	14	21	63	2	100
Large	—	47	9	39	5	100
Total	1	40	11	43	5	100

* Less than 1%.

measure of the true importance of feed companies, hatcheries, and large independent contractors in the supply picture. Much of the volume which they control is included under the "independent producer" column, because the processor tended to answer the question with only direct contracting between himself and the producer in mind. Live buyers are important in fowl procurement, in supplying poultry and egg stores, and to some extent as agents for processors in heavily populated areas. Plants which buy dressed poultry for eviscerating and cutting up obtain practically all of their supplies from slaughterers.

Many very small slaughtering plants are associated with farming enterprises, the processing unit converting the producer's own birds to dressed or eviscerated form for local sale. Other very small and small plants, primarily poultry and egg stores or roadside establishments, are heavily dependent on small lots obtained from independent producers and live buyers. Some small plants obtain a few lots from contractors or have an occasional flock grown on contract.

With the medium and large slaughtering plants, contract growing is an increasingly important source of plant volume. Medium-sized plants rely more heavily on secondary contractors than on direct contract growing.

As previously noted, much of the volume of medium-sized and large plants listed under the "independent producer" category is in reality grown under some contractual or financial arrangement between producers and secondary contractors. Live buyers are of minor importance to these size groups and are largely concerned with assembly of fowl and heavy young chickens.

In Areas 2 and 5, which lead in the production of commercial meat chickens, and in Area 4, where direct contracting by processors and secondary contractors is important, even on the basis of incomplete data, plants are able to procure about half their supplies within 25 miles of the plant, and another 25 percent within 25-50 miles. In contrast, the proportions are roughly reversed for Areas 3 and 6, the former concentrating on fowl, which tend to be scattered over a wide area, and the latter drawing heavily from eastern Connecticut. In some instances, the more distant figures may include live buyer operations known to the processing plant operator. As plant size increases, so does the size of the supply area. (Table 9).

Table 9. Supply Areas: Percentage of Volume Obtained Within Specified Distances from Slaughtering Plants

Area*		Distance 0-25 Miles	25-50 Miles	50-100 Miles	Over 100 Miles	Total
1		80	20	—	—	100
2		53	29	17	1	100
3		21	62	15	2	100
4		55	27	17	1	100
5		48	23	22	7	100
6		23	56	—	21	100
Plant Size	**No. of Plants**					
Very small†	—	80	12	8‡	—	100
Small	20	71	19	8	2	100
Medium	12	47	37	15	1	100
Large	13	45	33	17	5	100

* Based on data for small, medium and large plants.
† Data not collected on all plants in this group. Estimated from a sub-sample.
‡ Over 50 miles.

Market Outlets

Data on market outlets of processing units are influenced by the proportions of plants of different sizes. Very small units in all areas tend to deal directly with consumers and, secondarily, with stores, restaurants, hotels, camps, and institutions. In heavily populated areas, larger units have begun direct-store distribution on a significant scale. Area 3, which specializes in fowl, moves most of its volume through wholesale receivers. Chain store organizations and packer branches are important outlets for plants in Areas 2, 4, 5, and 6, taking 20-28 percent of the output. Plants in Areas 3, 4, 5,

and 6 sell 3-11 percent of their volume to jobbers and hotel and institutional supply houses. Central Maine, because of its volume and location, sells 80 percent of its output through wholesale receivers.

Very small slaughtering plants sell more than three-fifths of their volume directly to consumers and almost one-third additional to stores, restaurants, hotels, camps, and institutions. Store business is equally important to small plants, but on the remainder of the volume emphasis shifts away from sales to consumers and toward wholesale-type buyers. A continued shift toward wholesale receivers occurs with medium and large plants. Medium-sized plants tend to stress direct-store deliveries as the second most important outlet; large plants stress chain store organizations and packer branches. This difference is due at least in part to location of the medium-sized plants.

Table 10. Types of Buyers: Percentage Distribution of Slaughtered Output

Area	Consumers	Stores, Other Jobbing Outlets*	Wholesale Receivers	Other Wholesale Outlets†	Total
1	26	74	—	—	100
2	‡	‡	80	20	100
3	1	9	79	11	100
4	2	28	39	31	100
5	3	7	58	32	100
6	6	8	55	31	100
Plant Size					
Very small	63	31	3	3	100
Small	5	31	—	24	100
Medium	4	20	67	9	100
Large	—	5	68	27	100
Total	2	8	66	24	100

* Restaurants, hotels, camps, institutions.

† Chain warehouses, packer branches, jobbers, hotel and institutional supply houses, canners, eviscerating plants.

‡ Less than 1%.

Central Maine's volume moves more heavily to distant buyers (90 percent — 100 miles and over) than any other area studied. Next, with 44 percent, comes Area 3 (southeastern New Hampshire), where fowl is shipped out in quantity to distant points. Eastern Connecticut moves two-thirds of its output more than 50 miles, but only 21 percent more than 100 miles. Area 6 finds markets for 44 percent of its output within 50 miles of plants and for about all of the remainder within 100 miles. Areas 1 and 4 are able to place most of their volume within 50 miles. Data indicate a trend toward more distant outlets as plant size increases.

Table 11. Distribution Areas: Percentage of Sales to Buyers Within Specified Distances from Slaughtering Plants

Area**		Distance 0-25 Miles	25-50 Miles	50-100 Miles	100-200 Miles	Over 200 Miles	Total
1		40	55	5	—	—	100
2		*	*	9	43	47	100
3		8	37	11	8	36	100
4		52	31	3	14	—	100
5		8	25	46	17	4	100
6		23	21	55	1	—	100
Plant Size	No. of Plants						
Very Small†	—	82	15	3‡	—	—	100
Small	20	61	33	5	1	—	100
Medium	12	18	45	6	13	18	100
Large	14	8	9	22	31	30	100

* Less than 1%.

** Based on data for small, medium, and large plants.

† Data not collected on all plants in this group. Estimated from a sub-sample.

‡ Over 50 miles.

Seasonality and Storage

Seasonal variations in individual plant operations may occur either from the influence of changes in supplies or the demands of the market outlets serviced.

Slaughter of fowl exhibits greater seasonal variation than slaughter of broilers. Year-round commercial meat chicken production and contract growing minimize seasonal fluctuations in broiler supplies. Of 17 large and medium-sized plants, only two indicated broiler slaughter varied seasonally. Neither was engaged in contract growing. Only 4 of 8 small plants indicated broiler slaughter as steady, but many small plants are more influenced by local retail trade demands than by overall supplies.

Only 15 of 44 plants stored poultry for their own account. Four of these indicated quantities were negligible and storage was not a regular practice. Birds were not likely to be held beyond six months. Fowl was the most likely market class to be stored.

Four of the plants that stored poultry produced one-pound Rock-Cornish birds and marketed their products nationally. A large proportion of these birds is sold frozen and stored in warehouses throughout the country for quick delivery. It was indicated, however, that if possible, inventories were turned over each month.

III. Plant Organization, Practices, and Equipment

Unit Growth and Organization of Firm

No significant relationship exists between the type of business organization and length of time in business or the area in which located.

More medium-sized and large plants than small plants are incorporated. Indeed, with many of the two former groups, the processing unit may be only one of several units involved in a corporation; the others dealing with hatching, growing, contract growing, distributing, milling, etc.

Of 13 large plants, 11 indicated that the present management had begun processing operations in the post-World War II period. They started either as medium-sized or large. The two other units presently classified as large both started as small hand operations. Some other large units were operating earlier under different management, and perhaps on a smaller scale.

Of 30 small and medium-sized plants, 11 started prior to World War II and 17 after 1946. Again, some of the post-war starts may represent formation of new managerial arrangements to accommodate veterans and family members joining the firm. Only three firms — one in each size category — indicated the present management had begun processing during World War II.

Four small plants, one medium-sized plant, and two large plants reported no supplementary functions. Supplementary functions are activities of a plant other than assembling live birds, processing, and distributing processed birds, and are measures of integration.

Five small plants were, or recently had been, primarily growers, and produced many of the birds they processed. The five large processors carrying on growing operations limited these to certain classes (turkeys) which did not constitute a large share of plant volume, to breeding and experimental flocks, and to a few plant-owned broiler farms. In no case was the growing operation of the large unit a major contributor of plant volume.

The mere counting of functions can be misleading. In terms of the present shares of plant volume, contract growing is of negligible importance to medium-sized plants, but of considerable importance to large plants. Distribution of live poultry is still carried out to some extent by processing units. To some of the smaller plants, this volume may be important and may exceed volume sold in processed form. Some of the medium-sized and large plants evolved out of live buyer operations, and may still retain a few old contacts. For all plant sizes, the live market may function as an outlet for surpluses at particular seasons or of particular market classes.

For smaller plants, the egg handling operation is likely to be supplementary to the delivery of processed poultry to retail-level outlets. As size increases, the operation tends to move closer to the wholesale type. In this study, the two large processing plants handling a large volume of eggs were both cooperatives playing a major role as egg receivers in their localities. A few other plants marketed surplus eggs from their own breeding flocks.

Several small plants produced and hatched their own eggs as did two medium-sized plants involved in production of one-pound Rock-Cornish birds. A number of large plants carried breeders and either used local hatching facilities or jointly owned them.

Table 12. Business Organization and Size Development of Poultry Processing Plants

Present Size of Plant	Type of Business Organization				Period When Present Management Began Processing Operations					Capacity of Original Processing Unit		
	Proprietorship	Partnership	Corporation	Cooperative	Before 1930	1930–1939	1940–1944	1945–1949	1950 or after	Small	Medium	Large
	(Number of Units)				(Number of Units)					(Number of Units)		
18 Small	10	2	6	—	—	6	1	3	8	18	—	—
12 Medium	3	1	8	—	2	3	1	2	4	9	3	—
13 Large	—	—	10	3	—	1	1	7	4	2	6	5
Total	13	3	24	3	2	10	3	12	16	29	9	5

Table 13. Functions of Poultry Processing Plants other than Assembling, Processing, and Distributing Processed Poultry

Present Size of Plant	No. of Units Reporting Supplementary Functions	Growing	Contract Growing	Distributing Live Poultry	Handling Eggs	Hatching Operations	Feed Milling	Farm Supplies	Farming Other than Poultry	Total
Small	14	5	2	8	5	4	—	—	4	28
Medium	11	—	5	4	4	2	—	—	—	15
Large	11	5	8	4	7	5	2	7	—	38
Total	36	10	15	16	16	11	2	7	4	81

Two cooperatives maintained farm supply departments open to the general public, while a number of additional units handled certain supplies for their growers. One cooperative, whose primary business is feed milling and distribution, and one large independent processor, producing feeds for contract flocks and open market sale, accounted for the milling operations.

The tendency of firms processing poultry to engage in additional related business activity has been increasingly characteristic of the industry; so much so in recent years that the concept of integration, primarily vertical, is believed to be generally applicable. The extent of integration appears to be a function of firm size, although precise knowledge regarding this relationship is limited.

Small plant integration is most likely to be oriented toward one of three stages:

1. Growing (producer-processors).
2. Egg handling (retail-type outlets).
3. Live poultry distribution (surpluses or city locations).

Medium-sized plants may retain some small plant characteristics, i.e., they may be jobbing eggs or distributing live poultry on a regular basis. In addition, volume considerations may force them toward direct contract growing or participation in a cooperative deal with a secondary contractor.

If we ignore for the moment the producer-processor tie-in, where growing is of major importance, and other farming operations, then it is readily apparent that large plants tend to be more highly integrated than other size groups. This relates to the combination of assembling, processing, and distributing poultry with extensive contract growing, experimental and breeding operations, large-scale hatching, and large-scale handling of eggs, feed, and supplies.

Most small poultry slaughterers carry on slaughtering for sale as an adjunct to other activities. In contrast, larger plants regard the processing function as primary and build other activities to contribute directly to it. While diversification may be desirable for the smaller plant, a frequent result is insufficient attention to efficient use of resources.

Buying and Selling Practices

Determining Prices

Thirty-one of 42 plants (or 74 percent) reported use of the New York commercial quotations*, along with customary differentials, as a basis for determining buying and selling prices. However, nearly all plants visited received, for market information purposes, both the commercial and USDA Market News Reports.†

Several small and medium-sized plants producing their own birds did not determine into-plant values. Others relied on local market information. For selling purposes, markups over product costs, local demand conditions (especially on specialty items), and local market information were used by these plants.

The USDA reports an "at the plant" and "at the farm" figure for live birds, by market classes, for a "75 mile area" outside Boston.

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* The Producers' Price-Current, a daily report of the Urner-Barry Company, 173 Chambers Street, New York City.

† Daily Market Report, A.M.S., U.S.D.A., 408 Atlantic Avenue, Boston 10, Massachusetts.

Buying prices for live birds based on the New York commercial report are generally a specified number of cents per pound below the New York dressed quotation, although many plants now watch the eviscerated market closely. Selling prices may be at, above, or below the dressed quotation, depending on the supply picture, area of origin of the pack, quality differences, and types of outlets.

Thus, the actual average margin on which the plant expects to operate, i.e., to assemble, process, and deliver, cannot always be determined by the spread between the live and dressed quotations of the USDA report or by the discount under the New York commercial quotations.

In addition, plants which engage in direct contract growing employ various means to charge these live birds into the processing unit, so that a given plant could be charging in some at a "book value" and others at an open-market price established relative to a published quotation.

Larger plants tended to work on a smaller live-dressed price spread, i.e., 4½ - 6 cents on white broilers and 6 - 8 cents on fowl. Smaller operators usually worked on a 6-8 cents spread on various types of broilers and 7-8 cents on fowl. These spreads have narrowed in the past year or two. Most plants varied the spread according to quality considerations, such as white vs. colored or crossbred broilers, pinny vs. full-feathered fowl, and conformation and fleshing. Lot sizes and market outlets also influenced the spread. Some smaller plants bought at prevailing live prices, but had a wider total margin on which to operate because they sold to retailers and consumers. A number of very small units indicated they did not rely upon market quotations in buying or selling. This was true of some non-Kosher units as well as of many Kosher units. Some varied retail prices little, and at times bought birds at well over prevailing live prices.

Attitudes Toward Certain Types of Birds

Many of the larger plants dislike handling colored broilers or hens even at lower buying prices. Their plants and markets may be set up for one type of bird. On the other hand, smaller plants usually are glad to obtain small and mixed lots of birds from hatching and market egg producers. Acceptance of birds from non-commercial broiler growers is one method smaller operators use to continue in business.

Buying Small Lots

A definite relationship exists between plant size and the minimum size lot of birds a plant will process. A small lot of birds, which would be 10 minutes work for a large plant, might be a week's work for a small plant. Large processing plants generally are not interested in assembling small lots of birds. Many of the medium-sized plants are equally reluctant to accept small lots. These plants encourage the delivery of small lots to the plant, turn the sale over to a live buyer, or schedule pickup when the plant has a truck going into the area. Such plants may not own small trucks. One plant indicating 2,000 birds was a small lot, said it would pick up 1,000 birds only if its assembly crew was in the vicinity of the farm.

In contrast, most small plants want small lots of birds and frequently have difficulty in finding them. They may be unable to handle large lots available when a poultryman liquidates a large flock and so lose periodic small lots of culls. Broiler and hatching egg flocks from integrated oper-

ations are most likely to be moved through large plants. Small plants not interested in small lots were either growing their own birds or buying requirements from live buyers and doing no assembling themselves.

Pickup Routes

Few plants have scheduled pickup routes where the farmers with a few birds to sell know that the truck will be in a certain neighborhood on a regular schedule. Those plants having scheduled routes consider them contact work rather than an important source of plant volume.

Processing plants maintain a check on available lots by personal visit or telephone. In some cases birds are inspected at the farm prior to agreement on prices or arrival of the pickup crew. Since most arrangements for pickup are made in advance, plants can plan their routes to pick up small lots offered if they want them.

Growing Programs Related to Procurement

Contract growing programs and fieldmen play an important part in the procurement plans for some plants, especially the six plants in Maine which are highly integrated. To assure themselves of the quantity and quality they want, these plants contract for 80-95 percent of their volume. Fieldmen keep in close touch with these flocks and advise the plant of their progress.

Except for two plants that handle the Rock-Cornish bird exclusively, plants outside of Maine do not utilize direct contract growing to the same extent. Fieldmen for these plants, while doing a certain amount of service work, are primarily buyers. Most plants maintain informal contacts with secondary contractors and independent growers in an attempt to assure themselves of future supplies. They may also participate formally in two- and three-way contracts. In such cases, their role is usually limited to purchasing the birds at an agreed time and on a specified pricing basis.

Delivering Small Orders

Size of plant, types of outlets serviced, and distances to markets served, influence the plants' policy of handling small deliveries.

The six large plants in Maine shipped nothing less than truck lots. Six other large plants indicated they would deliver small lots on regular routes. One was willing to deliver orders as small as 10 boxes. One would go a block or two off the route to deliver one box to a regular customer. Another would go 20 miles to deliver 25 boxes to a regular customer. To make a special trip, two plants said they would go 2 or 3 miles to deliver 2 or 3 boxes locally and another would take 5 boxes 20 miles. Other plants put the lower limit for special trips at 25-50 or 100 boxes.

Four of 11 medium-sized plants made no small deliveries. These plants either sold to one outlet or were remote from any sizeable local markets. Only one plant mentioned regular routes, and would deliver 1-2 boxes. To care for special orders the limit for the remaining 6 plants varied from 4 birds on mail orders to 15 boxes up to 20 miles.

Two of 17 small plants indicated they made no small deliveries. Of these two plants, one made no deliveries and the other delivered all to one place. On regular routes, 4 small operators said they would deliver 1-2 boxes or less. To make a special trip the amount varied from "any amount" locally

Table 14. Procurement and Selling Practices of Poultry Processing Plants

Number and Size of Plants	Buying Prices Based on			Selling Prices Based on			Plants Having				
	U.B.[1]	U.S.D.A.[2]	Other	U.B.[1]	U.S.D.A.[2]	Other	Own Growing Program	Field Men	Scheduled Pick-up Routes	Will Pick-up Small Lots	What Constitutes Small Lots[3]
17 Small	10	4	3[4]	10	3	4[5]	0	0	1	14	25 and 50
12 Medium	9	1[6]	3[7]	8	0	4[8]	3[7]	3[7]	3	8	100
13 Large	12	0	1[9]	13	0	0	6	11	2	6	500

1. The Producers' Price-Current, Urner-Barry Company, 173 Chambers Street, New York City.
2. Daily Market Report, A.M.S., U.S.D.A., 408 Atlantic Avenue, Boston 10, Massachusetts.
3. The mode, number of head.
4. Two produce own birds — one watches local market.
5. Two — 20% own cost, one Kosher market, one own formula.
6. Watches both sheets.
7. All produce the one-pound Rock-Cornish bird.
8. Three, the one-pound deal; one a Kosher market.
9. Eviscerated market.

to 10-15 boxes, 30 miles. One owner said he had delivered 12 fowl 10 miles. Most of these small plants sell within 25 miles, much of it "locally", and their willingness to handle small orders has been a big factor in their success.

Non-economic Factors in Buying and Selling

Non-economic factors play an important role in buying and selling activities. Most plants maintain that they "treat growers fairly" and, hence are able to continue to obtain their birds. Few advertise in the local press; some distribute calendars and pencils. In the main, personal contacts are of major importance and many growers continue to do business with certain buyers because congenial relationships are maintained. In selling, personal contacts and impressions are exceedingly important; probably much more so than trade advertising, calendars, etc. Such "non-economic factors", more than short-run price considerations, explain many of the existing buying and selling arrangements of the individual firm.

Assembly and Delivery Equipment

Crates, rather than batteries, were used by all plants hauling live birds. Some plants were experimenting with crates for feeding birds, thus seeking to eliminate the transfer of birds from crates to holding batteries at the receiving station. Outbound shipments were predominantly ice-packed in wirebound boxes. Many small plants still used orange crates. A small amount of poultry was packed and frozen in cardboard cartons.

Transportation equipment used for assembling and delivering poultry varied with plant size. All plants but one in each size group owned platform trucks for assembly purposes. Three-fourths of the large plants owned trailers as compared to one-sixth of the medium-sized plants and none of the small plants. Large plants have, on the average, three times as many trucks as trailers. This suggests limitations in use of trailers on assembly due to country roads, bridges, maneuvering space at the farm, and length of haul. For delivery purposes, where larger volumes and longer hauls are likely, practically as many trailers as trucks were owned.

Pick-up trucks were more common among medium and small-sized plants. None of the large plants indicated ownership of them as primary vehicles for hauling poultry, but did use them for service work and odd jobs.

One plant in each size group owned no equipment for assembly. The large plant, raising most of its birds on contract, hired a trucker at a specified amount per pound to pick-up and deliver the birds to the plant according to a schedule set up by the plant management. This trucker also cleaned out and disinfected chicken houses between flocks. The medium-sized plant worked closely with three or four live buyers who did the buying in the field and delivered to the plant. A small plant, turning out Koshered poultry, owned no trucks as all birds were delivered to the plant by live buyers and farmers and all dressed poultry was picked up at the door.

Many large and medium-sized plants rented delivery equipment or shipped via trucking concerns. None of the small plants hired or rented equipment for either assembly or delivery. One of the medium-sized plants and six of the small plants used the same equipment for both assembling and delivery. In Tables 15 and 16, these trucks are included under Assembly.

Table 15. Number of Plants by Size Group With Type of Assembly and Delivery Equipment

Number and Size Group	Assembly Type of Vehicle				Delivery Type of Vehicle			
	Platform Trucks	Platform Trailers	Pickups	Hired	Vans	Trailer Vans	Other[1]	Hired
18 Small	17	0	7	0	2[2]	0	3	0
12 Medium	11	2	6	1[3]	7[4]	0	1	5[5]
12 Large	11	8	0	1[3]	3	3	1	9[6]

1. Panel trucks or station wagons.
2. 6 of the 18 use the same equipment for both assembly and delivery.
3. 1 of the 12 hires all the assembly work.
4. 1 of the 12 uses the same equipment for both assembly and delivery.
5. 2 of the 12 hire all the delivery work.
6. 9 of the 12 hire all the delivery work.

Table 16. Average Number of Trucks and Trailers per Plant[1]

Size Group	Assembly Type of Vehicle			Delivery Type of Vehicle		
	Platform Trucks	Platform Trailers	Pickups	Vans	Trailer Vans	Other
Small	1.5	0	1.0[2]	1.0	0	1
Medium	2.6	1.0	1.0[2]	1.8	0	2
Large	7.3	2.5	0	3	2.5	1

1. Where no trucks are hired, averages include only those plants having that type of equipment.
2. These pickups are probably used for both assembly and distribution.

The vans and trailers used for delivery purposes were all insulated and/or refrigerated. Some of the medium-sized and most of the small plants made local deliveries in uninsulated trucks of various descriptions.

In addition to the rolling stock previously described, dump trucks were in evidence at many of the large and medium plants. These trucks were used to haul feathers, manure, and offal to the dump. At some plants these trucks were owned by farmers who are glad to get the feathers and manure for their land and the offal for their pigs.

Processing Plant Equipment

Technological changes in the equipment used by processing plants for both dressing and eviscerating have been many and rapid. Basically, these changes involved the development of volume methods in processing and

handling and efforts to secure a standardized and good quality product for a mass market. In the larger plants more equipment has been discarded in recent years because of obsolescence than wear. In a few cases, pieces of equipment or even whole new processing lines, became obsolete before they were installed.

However, there is still much old equipment in use particularly in small plants without overhead lines, although some of the larger plants are still getting satisfactory service out of scalders and pickers that have been in use for many years. The newer machines are larger, more versatile in the jobs they can perform, and more automatic in operation. There undoubtedly is a close correlation between plant size and average age of the equipment.

Overhead Lines

Table 17 shows the relationship between size of plant as judged by annual volume and the size and type of various pieces of equipment. Naturally the line has to be long enough to accommodate the equipment used. The length of the dressing line for the large plants ranged from 290 feet to 550 feet. For the medium-sized plants the range was 100 feet to 250 feet. One exceptional plant in this group had a line 400 feet long. This plant New York-dressed in the morning and eviscerated in the afternoon. All of the large plants for which data were available indicated a 6-9 inch shackle spacing on dressing lines. For medium-sized plants the average was about 12 inches. Hence, this factor (related to handling more fowl) may partially explain why many dressing lines in medium-sized plants are longer in relation to volume than for large plants.

Feeding

At the time the survey was made the practice of feeding poultry was quite general throughout the sample area. The only plants not feeding at all were those handling one-pound birds. Specific space for a feeding station was not provided at some of the small plants, but birds could be fed in crates if necessary. Some reasons given for feeding were: to put the final bloom on the bird; to recover shrinkage; and to even out plant operations. In general, time on feed was of short duration. Feeding of fowl was most likely to be an overnight holding proposition due to the limited weight gains possible.

Scalding

Scalding is an operation that requires particular temperatures for definite lengths of time, depending on class and condition of birds. In general, scald temperatures used on fowl run about two degrees higher than for broilers. Most small plants were likely to use higher scald temperatures than medium-sized or large plants. Scalders in plants without overhead lines are loaded and unloaded by hand. Dunking and timing are done mechanically or manually. In plants with overhead lines, length of scalders is largely determined by the speed of the line. Thus, since the larger plants have a faster-moving line, they need a relatively longer scalder to produce the desired results. Scalders in large plants ranged from 30 to 55 feet in length and in the medium-sized plants from 12 to 30 feet.

Table 17. Number of Plants by Size Group and Size and Type of Equipment

Number and Size Group	Average Length of New York Dressed Line	Average Size of Scalder	Average Number of Large Automatic Pickers	Number of Plants Using —									Number of Plants Eviscerating
				Side Line Machines	Manual Pickers	Quill Pullers	Special Neck Scalders and/or Pickers	Special Hock Scalders and/or Pickers	Singers	Washers	Automatic Weighers	Feeding Stations	
19 Small	—[1]	—[2]	—[1]	0	19	1	0	0	1	0	0	12	9[3]
12 Medium	210′	18′	2.1	7[4]	2	11	5	5	4	7	3	9	6[5]
14 Large	440′[6]	40′	4	2[7]	0	14	10	11	10	14	11	14	11[5]

1. Only one plant uses a powered line. It handles the 1 lb. bird exclusively.
2. Kosher plants do not use scalders. Of the 17 plants using scalders, 1 is a continuous type (12′); 1 is a self-contained chain unit; 10 are automatic dunking types; 5 are dunked by hand.
3. One plant uses powered eviscerating equipment (wheel).
4. Average 1.4 machines per plant.
5. All plants in this group use a powered line.
6. Not including 2 plants using the basket type pickers.
7. Each plant has but one machine. For special jobs only.

The small, manually operated drumpicker is still basically the same as when first introduced and machines were observed that had had all parts replaced at one time or another. Newer models have been introduced, some with two drums and with fingers of different shapes and resiliencies for special purposes.

Manual pickers and small operations go together. Where these machines were operated by the medium-sized plants they were often used as finishing machines after the birds had been passed across sideline machines. The number per plant varied from one to three. There were single and double-operator units and single and double-drum machines.

In sharp contrast to hand-operated pickers are the large automatic machines installed in series in plants with overhead lines. These pickers, together with special neck and hock scalders, have tended to replace the sideline machines. Four was the standard number of these machines used by the large plants without any sideline machines. In the medium-sized plants the number ranged from one to four, together with one or two sideline machines. As the terminology implies, the automatic pickers do not require individual operators. The sideline machines, on the other hand, are generally double-width and may require two operators each. By installing one additional automatic picker a processing plant being studied took two sideline machines off the line, thus releasing up to four workers.

The basket-type pickers are the latest innovation in the dressing operation. They were observed in operation in a very small poultry and egg store as well as in one of the largest plants. The plants using these machines claimed certain advantages for them: versatility, smaller space requirement, a reduction in number of workers, and a high-quality finished product. Where observed, it apparently made unnecessary the quill machines as well as the special neck and hock scalders and pickers. A plant that was remodeling found it could put its New York dressed line, using two of these machines, in a small addition to the present structure and release sufficient area in the original plant to install an eviscerating line.

Quill pullers must still be operated manually. Except as noted above, they were used by all of the large plants. Some of the larger plants used two machines with one or two operators each. Only one medium-sized plant, and all but one small plant pulled wing and tail feathers by hand.

Other Equipment

Singers, washers, and automatic weighers were used by most large plants and by half or less of the medium-sized plants. In-plant chlorination was found in only a few plants.

Refrigerated storage facilities were available at most plants in all size groups. However, many very small or small plants, selling at retail or delivering locally, used no ice in cooling or packing. Ice-making machines were used by about half of the large and medium-sized plants, but in only two small plants.

Three types of ice were used: crushed, flaked, and slush. With crushed ice, cakes must be unloaded into the plant and fed into the crusher. Flaked ice is made at the plant and accumulated in storage. Both crushed and flaked ice must be hauled in tanks to the points of use. Slush ice is made and delivered through a completely mechanized system to points of use.

Hand trucks and roller conveyors were commonly used by most plants with a few larger plants using fork-lift trucks and conveyor belts. Other specialized equipment used in a few plants included: turntables for batteries, aligners for shackles to facilitate hanging live birds, cooling tank dumpers, mechanical lifts to facilitate removal of birds from cooling tanks, and mechanical packing-box closers.

All medium-sized and large plants which eviscerated had powered overhead lines. Except for very small and small plants selling at the retail level, cutting-up of poultry by processors was confined to a few large plants. Less than half of these large plants had separate cut-up lines.

Plant Operating Practices

Adjustments in Operations

Considerable flexibility with respect to labor and equipment can be built into a processing plant. With a sustained reduction in volume, a skeleton force can be employed, or the plant can be operated fewer days or hours at "normal" rates of hourly output. With above-normal volume, a limited amount of additional full or part-time help can be added to one shift, a second shift added, or the regular force worked overtime at a higher rate of pay. These alternatives represent important problems requiring additional study in connection with economies of scale.

Within the framework of a relatively "normal" daily and weekly work load, short-run adjustments can be made. Changes in volume can be met by varying the working speed (changing line speed or skipping shackles), or by minor adjustments in length of work day or labor force. For variations in market classes or condition of birds, scald temperatures can be raised or lowered, internal adjustments made in automatic pickers, sideline machines employed for finishing, or the amount of pinning labor modified.

Split-phase vs. Continuous Operations

In very small, small, and many medium-sized plants the same crew performs several functions. At least part of the crew which works on dressing may work on assembling, eviscerating, or packing. Usually, such a plant dresses only a few hours per day (until cooling tanks are full). Then, most of the crew may shift over to packing, while others may clean up the dressing area. Hence, in many plants, either with or without an overhead line, operations are not continuous in the sense that all phases are carried out simultaneously. Operations are split into successive phases on which almost all employees are engaged. In small and very small plants a common area may serve several purposes.

The implications of split-phase operations in terms of labor efficiency and usage are as follows:

1. With small volume, a plant can employ a smaller crew full-time rather than a larger crew part-time.

2. Employees cannot become specialized in any one phase of the operations, and hence, may be less efficient. This also implies a different social structure among plant employees than under conditions of continuous operation where specialization is enhanced.

3. Plants employing split-phase operations can probably turn out as sanitary a product as those with continuous operations and overhead lines. Various phases can be separated by shields, partial partitions, and by time rather than by distance and full partitions. But to do this, relatively more time may be needed for clean-up operations between phases.

4. Split-phase operations are likely to be accompanied by a nearly uniform hourly rate of pay for all operating employees, whereas with continuous operations (specialization) a differentiated pay scale is likely to exist.

Labor Problems

Most plants indicated they experience a moderate turnover in labor. For many, this is likely to be heaviest in a 10-20 percent segment of the labor force. Variable hours and the concept of poultry dressing as a "dirty job" may contribute to turnover.

Small plants rely heavily on family labor, and the small amount of additional labor needed consists of a few long-time employees, local housewives, retired people, high school students employed part-time, and a few "floaters". Many medium-sized plants rely on similar groups. Many of the large plants, while not greatly concerned with the rate of turnover they experienced, made an effort to stabilize hours to keep regular help.

Near large cities there is increased competition from alternative industries. Unless higher wage rates are paid to keep a better caliber of help, a higher rate of turnover may exist. Aside from an indication of somewhat higher wages in plants in or near the Boston Metropolitan area, average wages paid, by plant size or area, did not appear to differ significantly.

Waste Disposal Practices

Most small plants were hauling, or hiring someone to haul feathers, blood, offal, and manure to dumps or incinerators. Half of the medium-sized plants and all of the large plants were able to arrange for renderers to pick up feathers at the plant. All of the medium-sized and large plants which eviscerated were able to get renderers or farmers (mostly piggeries) to pick up this waste at the plant. The same was true for most plants in these size groups with respect to blood and manure. Some plants dumped blood and manure into sewage systems. A few plants were emptying waste materials into open streams or tidewater. Apparently, the more limited volume of waste materials available at small plants was a deterrent to the development of paying outlets. Added costs for haulage thus accrued to such units.*

* For a more complete discussion of poultry plant waste disposal, see: Kahle, H. S., and L. R. Gray, *Utilization and Disposal of Poultry By-products and Wastes,* Marketing Research Report. No. 143, AMS, USDA, Nov. 1956.

Table 18. Waste Disposal Practices of Poultry Processors

	Dump or Incinerator		Rendering Plant Pick-up	Farmers		Own Sewage Disposal System	Open Stream or Tide-water	City Sewage System
	Plant Hauls	Hired Hauling		Plant Hauls	Picked Up			
	(Number of Plants Reporting)							
Feathers:								
18 Small	14	2	—	—	2	—	—	—
12 Medium	4	1	6	—	—	—	—	—
13 Large	—	—	13	—	—	—	—	—
Blood:								
18 Small	10	2	1	—	2	—	—	3
12 Medium	1	1	4	—	4	—	1	1
13 Large	2	—	4	—	3	—	1	3
Offal:								
9 Small	3	2	1	2	1	—	—	—
6 Medium	—	—	2	—	4	—	—	—
11 Large	—	—	8	—	3	—	—	—
Manure:								
18 Small	11	2	—	1	3	—	—	1
12 Medium	4	1	—	—	5	1	1	—
13 Large	5	—	2	1	2	—	1	2
Sewage:*								
18 Small	—	—	—	—	—	8	—	10
12 Medium	—	—	—	—	—	9	2	1
13 Large	—	—	—	—	—	4	2	7

* Include waste water from processing operations.

IV. Preliminary Estimates of Labor Efficiency and Plant Utilization

Labor Efficiency in Small, Medium, and Large Plants

On the initial survey data were obtained on numbers and types of employees and number of hours worked. These data represented in most cases "typical" or "average" operations. Hence, in this analysis it is recognized that insofar as each individual plant is concerned any derived ratio represents an unknown point on the individual plant cost curve, and that there may be little or no certainty that it is the true "average" for the unit. Since dollar cost data were not obtained, these preliminary comparisons relate only to volume and hours. The suggested relationships will be tested further in later phases of the study by obtaining more precise and detailed time and cost data from a limited number of plants of varying size and type and by employing a synthetic method of analysis.

Data were initially separated into several categories:

(1) management, (2) assembling, (3) dressing, (4) eviscerating, and (5) distributing (delivery to the buyer). The management category includes such functions as executive, buying, selling, research, personnel, field, clerical, bookkeeping, accounting, and legal services. The assembling category was confined to the pick-up of poultry by the plant and did not include unloading. The dressing category included unloading, feeding, hanging, killing, picking, pinning, singeing, washing, weighing, cooling, packing, clean-up and maintenance, and loading-out as applicable. The eviscerating category included drawing, cutting-up, weighing, washing, cooling, packing, freezing, clean-up and maintenance, and loading-out as applicable. The distributing category involved the delivery of the finished product to the buyer, including any unloading done by the delivery crew, but not the full loading labor prior to hauling. Operating categories included direct supervisory employees.

Volume intervals in Table 19 were determined by arraying individual observations in ascending magnitude; determining the widest breaks between successive numbers; and computing weighted averages of observations between these breaks. Because of variations in the proportions of various market classes handled, the series on pounds and head count shows slightly different progressions.

Management

The allocation of management cost to operating functions for any size of plant poses difficulties. Such an allocation can be made in several ways, i.e., proportionate to physical volume, proportionate to dollar volume, or by recorded time sampling. With respect to smaller plants, it is difficult to make an initial separation of the owner's time between managerial and operating duties even on an aggregate basis.

An allocation of management (other than field men) was made to operating functions on the basis of physical volumes. With this method there was little reason to conclude that management time was other than a fairly constant ratio to operating labor as plant size increased.

Assembling

Data derived on output per man-hour in the assembling operation were somewhat less conclusive. These results contained and obscured certain variables. For example, it would be expected that output per man-hour would decline, other things being equal, as the volume of birds assembled increased. Since other information presented earlier shows that larger plants tend to reach farther for supplies, such a relationship would tend to be inverse with volume. However, smaller plants are likely to be oriented toward procurement in small quantities and a greater number of lots per given load. Hence, the smallest plants might be handling relatively more small and partial loads and, other things being equal, be less efficient because of small volume. Indeed, the data indicate some increase in output per man-hour through the first few intervals covering small plants where supply areas were similar. Data obtained on other commodities suggest that output per man-hour may often decline with large crews. This is due in part to the loss of working time in travel and preparation as well as to the presence of more help than can be used to best advantage at all stages.* This may also be involved in assembling poultry, though time disadvantages in assembling could be offset by cost considerations involving equipment and subsequent plant operations.

As previously pointed out, contract growing, and in particular a large share of the time of field men, is a substitute for buyers and public relations measures. When the time of the field men was allocated to the assembly operation, such units appeared substantially less efficient in this operation than plants of similar size which did not engage in direct contract growing. In lieu of direct contracting many large plants have attempted to stabilize plant volume at a high level by entering into arrangements with secondary contractors (feed companies, hatcheries, or independent investors).

New York Dressing and Eviscerating

On the basis of these data it appears that output per man-hour of labor increases rapidly with unit size (volume). This suggests there are substantial economies of scale insofar as labor usage is concerned. It cannot be ascertained from preliminary data exactly how this conclusion might be modified by the effects of investment and depreciation of buildings and equipment or other cost components attributable to the dressing and/or eviscerating operations.

If substantial economies of scale exist relative to output per man-hour in dressing and eviscerating, then larger plants might well afford lower output rates on assembling to obtain supplies needed for continued plant operation at a high rate of potential capacity. Not only can they reach out over greater distances, but they may be able to employ larger crews, even though output per man-hour in assembling might be lower than with smaller crews, to keep the assembly operation feeding volume to the plant.

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* See: Rogers, G. B. and H. C. Woodworth. Distributing and Handling Grain-Feeds in New Hampshire. II. Problems in Retail Distribution, New Hampshire Agricultural Experiment Station Bulletin 427, July 1956, pp. 28, 32-33.

Table 19. Output per Man-Hour: Preliminary Estimates for Various Unit Operations, Excluding Management, by Unit Size

Basis of Computation:	Operation					
	N. Y. Dressing		Eviscerating		Mostly Wholesale Distributing	
	Average Number Per Week	Number Per Man Hour	Average Number Per Week	Number Per Man Hour	Average Number Per Week	Number Per Man Hour
Pounds	2,100	27.1	297	18.6	—	—
	6,473	55.0	6,223	32.1	6,206	368.7
	11,128	80.5	—	—	13,670	729.1
	33,390	84.9	28,440	54.7	51,801	1,172.9
	87,980	86.4	77,858	67.4	—	—
	238,613	139.7	—	—	178,236	1,411.1
	352,600	164.8	386,900	89.4	342,423	1,617.7
	498,952	188.3	—	—	—	—
Number of Head	875	8.6	571	5.9	987	69.3
	1,326	10.7	1,501	7.2	1,525	77.6
	2,351	16.5	—	—	2,607	130.3
	8,965	18.3	6,546	12.6	8,596	214.9
	25,040	20.2	20,126	17.4	15,699	299.0
	64,770	33.9	44,552	20.4	47,673	376.4
	101,970	45.6	—	—	86,510	408.7
	140,300	52.4	122,907	22.8	—	—

Distributing

Output per man-hour in distributing (largely hauling time) tends to rise with volume. Some smaller units concentrate on selling to small volume purchasers, such as stores, institutions, or local distributors. In such cases, with more stops and smaller quantities per stop, output per man-hour is lower than for units of like size delivering to large volume purchasers, such as wholesalers, chain warehouses, and packer branches. For firms selling mostly to large volume purchasers, output per man-hour tends to increase with volume, despite the probability of longer average distances. Since distributing is a one or two-man operation, size of equipment rather than number of men being the greater variable, the data show a more conclusive trend than on assembling.

Larger equipment can be used in distributing, as well as in assembling, as volume increases. When this occurs it may be profitable to use additional labor to offset increases in costs associated with equipment which might otherwise be incurred. With respect to distributing, the data suggest the existence of economies of scale, but they represent a composite of several factors, i.e., volume, distance, types of buyers, etc. Volume seems to exert the greatest influence, since the output per man-hour rises with size intervals. With a delivery crew of one or two men, use of larger equipment enables the handling of greater volume. This effect, plus a greater concentration on large volume buyers, is apparently greater than the negative effect of increased distance and travel time.

Labor Efficiency in Very Small Processing Units

Data obtained for these plants were in considerably less detail and not standardized to the same degree as that obtained for larger size groups. Many of the labor figures were related to sub-operations, such as killing and picking or drawing, occurring within the plant, rather than to the broader operations within and without the plant. Some of the problems encountered in trying to compare these data are that they may include various proportions of time for such functions as waiting on customers, when retail selling occurs on the premises; work methods may be significantly different, at least when compared to medium and large plants; and, the data are less inclusive than for small plants, even though methodology is similar.

One example of this was the almost complete omission of unloading and feeding from the very small plant data related to the dressing operation. Maintenance was also generally excluded. Particularly in poultry and egg stores, dressing and drawing individual birds to order was widely practiced, as distinguished from the types of operations in small, medium, or large processing plants. Many very small plants, particularly poultry and egg stores, used a walk-in cooler, freezer, or a cabinet refrigerator and wrapped without ice, as compared to ice or water cooling and ice-packing in boxes. There was little or no singeing or washing (prior to cooling, where immersion in water is used). Pinning was eliminated by some units using higher temperatures in scalding, longer buffing (even though abrasion was increased) or other modifications such as dipping in wax or rolling in sawdust. In some plants, time devoted to cleanup was insufficient to achieve even a reasonable semblance of sanitation. By shortcutting, many very small plants improved their competitive position vis-a-vis output per man-hour, but this can continue only so long as buyer acceptance is not impaired or formal sanitation requirements are not enforced.

Utilization of Plant Capacity

Using data on annual volume and on the number of birds or pounds handled per hour under typical operation, estimates of the relative utilization of plant capacity were derived. Herein, these estimates are expressed as percentages. Basic to their derivation are certain assumptions or standards applied equally to each plant:

1. A 40-hour work week, 52 weeks. The annual operating hour figure of 2,040 also makes allowance for 5-6 paid holidays. It is also assumed that vacations will be taken in rotation, not en masse, since regular and continuous plant operation is usually desirable.

2. That the assembly and distribution functions are flexible enough, on the one hand, to supply any quantity required and, on the other, to readily dispose of the plant output. All functions are assumed to be geared to the normal "line speed" (or, for plants without lines, to normal output per hour in the dressing and/or eviscerating operation).

3. No attempt is made to adjust individual plant layouts or practices toward maximum efficiency. Ratios derived herein merely reflect the degree of utilization under the present arrangements.

4. A similar distribution of market classes is assumed to prevail at capacity as now prevails with present operations for each unit.

On the average, percentage utilization of processing capacity increases with size. Within the groups themselves there is considerable deviation from the average, indicating differences in the emphasis on processing and on distributing at levels above wholesale in allocating employee time, in location, market classes handled, and in the extent to which management has been successful or willing to go in keeping the processing set-up operating.

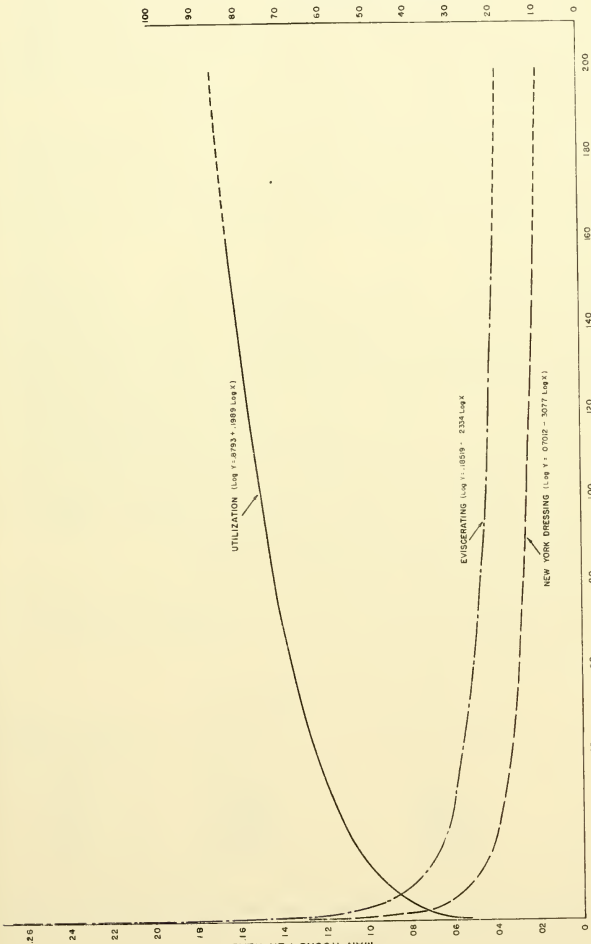
PERCENT OF PLANT CAPACITY
MAN HOURS PER HEAD
PLANT VOLUME - THOUSAND HEAD PER WEEK
UTILIZATION (Log Y = .8793 + .1989 Log X)
EVISCERATING (Log Y = .1859 + .2354 Log X
NEW YORK DRESSING (Log Y = .0702 + .3077 Log X)

Figure 3. Preliminary estimates of economies of scale indicated by labor requirements in New York dressing and eviscerating and percent utilization of plant capacity.

Smaller plants may conduct part-time operations by choice, i.e., emphasis on retailing and jobbing rather than wholesaling. Those small and medium-sized plants which concentrate on fowl and roosters are likely to show wider seasonal variations in volume than plants concentrating on broilers and other young chickens grown and sold throughout the year. Hence, capacity may relate to the seasonal peak in volume.

Many of the obtained estimates of capacity based on line speed or volume per hour probably overstate the sustained rate of operation of the unit with the result that the percentages of utilization of capacity may be somewhat low. Rated capacities are frequently maximums and do not reflect sustained working speeds of employees or the increased maintenance which might be required on equipment. Again, even after the best of planning, it may be virtually impossible to anticipate the occurrence of breakdowns and other incidents which would reduce maximums to practical rates.

The data do suggest the existence of excess processing capacity. Such excess over current volumes processed could be used to process poultry which now moves out of some of the particular areas included in the study and/or allow for some increase in production above current levels. These data relate only to plants in the small, medium, and large brackets. Excess capacity also exists in very small plants, probably to a greater degree on the average than for small plants.

The absolute magnitude of plant and equipment costs or their ratio to volume may also hold some clues with respect to the lower rate of utilization of capacity for smaller plants. Large plants face very substantial fixed costs related to plant and equipment, and because of the magnitude of these, will try to maintain volume at a high level to defray these charges. With smaller plants, these fixed costs are much smaller in magnitude, even though they may be greater per unit of volume than in larger plants. With given labor resources (including unpaid family and operator's labor) the small operator may feel he can maximize his total returns by emphasizing phases other than processing. Indeed, he may be unable to expand plant volume without adding more paid resources in terms of labor or payments to others for assembling or distributing, or without maintaining a larger investment in plant and equipment if operations are seasonal in nature.

Table 20. Utilization of Plant Capacity by 32 Poultry Processors

Number of Plants	Average Number of Head		Percent of Capacity
	Handled Per Year	Full Capacity Per Year*	
10	81,100	223,380	36
6	693,500	1,710,200	41
5	1,444,400	3,060,000	47
5	4,001,800	5,548,800	72
6	6,370,550	7,140,000	89
32			

* Based on line speeds and/or number per hour in plants without overhead lines.

V. Appendix

Commercialization Scoring

In establishing the degree of commercialization of poultry meat production in individual counties of New England, six measures of aggregate volume, average unit size, and density of production were used. These were total number of hens, roosters, pullets, etc., sold; total number of broilers sold; number of hens, roosters, pullets, etc., sold per farm reporting; number of broilers sold per farm reporting; number of hens, roosters, pullets, etc., sold per 100 acres of farm land; number of broilers sold per 100 acres of farms reporting; number of hens, roosters, pullets, etc., sold per 100 acres of farm land; number of broilers sold per 100 acres of farm land. Under each of the six categories, data for the 67 New England counties were arrayed in descending magnitude. Intervals shown in Appendix Table I were derived on the basis of distinct breaks in the array and point scores assigned for seven frequencies.

Since broilers (Census classification) and related classes account for about 75 percent of the poultry meat production and hens, roosters, pullets, etc., for 25 percent, the accumulated point score for broilers was multiplied by 3 to give the proper weighting in terms of supply. In order to convert scores to a percentage of 100 (index basis), the accumulated and adjusted point scores were multiplied by 1.388, it being possible for the county scoring "6" under each category to obtain an adjusted score of 72, i.e.

Hens, roosters, pullets, etc.	6+6+6	= 18
Broilers	6+6+6 = 18 x 3	= 54
		72

$$\frac{100}{72} = 1.3888$$

For purposes of designation in the study, those counties with an index of 0-39 were described as non-commercial; 40-69, as semi-commercial; and 70 and over, as commercial.

Appendix Table I. Point Scoring System for Determining Degree of Commercialization of Poultry Meat Production in Individual Counties

Point Score	Total Number		Number Per Farm Reporting		Number Per 100 Acres of Farm Land	
	Hens, Roosters, Pullets Sold	Broilers Sold	Hens, Roosters, Pullets Sold	Broilers Sold	Hens, Roosters, Pullets Sold	Broilers Sold
0	0- 19,999	0- 59,999	0- 199	0- 1,999	0- 49	0- 49
1	20,000- 59,999	60,000- 199,999	200- 399	2,000- 4,999	50- 99	50- 149
2	60,000-119,999	200,000- 499,999	400- 599	5,000- 7,999	100-149	150- 299
3	120,000-199,999	500,000- 899,999	600- 799	8,000-12,499	150-199	300- 499
4	200,000-299,999	900,000-1,399,999	800- 999	12,500-16,999	200-299	500- 899
5	300,000-419,999	1,400,000-1,999,999	1,000-1,399	17,000-21,999	300-399	900-1,499
6	420,000 and over	2,000,000 and over	1,400 and over	22,000 and over	400 and over	1,500 and over

Appendix Table II. Information Related to the Classification of Counties for Sampling and Grouping Purposes

State and County	1954 Commercialization Score	1954 Ratio of Pounds of Broilers Produced to Farm Chickens Produced (x/1.0)	Distance from Markets[1]	1954 Surplus (+) or Deficit (—) Status[2]			1950 Population
				Broilers	Farm Chickens	Total Chickens	
				Million Pounds	Million Pounds	Million Pounds	Thousand
Maine:		3.6		+100.31	+23.52	+123.83	914
Androscoggin	83	3.5	Remote	+ 6.59	+ 1.53	+ 8.12	84
Aroostook	3	0.0	Remote	— 2.11	— .14	— 3.25	96
Cumberland	68	1.4	Intermediate	+ 1.70	+ 2.01	+ 3.71	169
Franklin	32	1.9	Remote	+ .39	+ .21	+ .60	21
Hancock	53	1.4	Remote	+ 1.46	+ 1.26	+ 2.72	32
Kennebeck	89	6.6	Remote	+ 20.07	+ 2.40	+ 22.47	84
Knox	82	2.3	Remote	+ 6.24	+ 2.64	+ 8.88	28
Lincoln	79	0.6	Remote	+ 3.10	+ 5.55	+ 8.65	18
Oxford	56	1.9	Remote	+ 2.28	+ 1.26	+ 3.54	44
Penobscot	78	4.4	Remote	+ 7.74	+ 1.13	+ 8.87	108
Piscataquis	37	1.1	Remote	+ .07	+ .23	+ .30	19
Sagadahoc	61	10.8	Remote	+ 2.07	+ .01	+ 2.08	21
Somerset	67	4.5	Remote	+ 7.31	+ 1.41	+ 8.72	40
Waldo	92	16.1	Remote	+ 40.45	+ 2.30	+ 42.75	22
Washington	12	0.0	Remote	— .77	+ .25	— .52	35
York	68	2.3	Intermediate	+ 3.72	+ 1.46	+ 5.18	94

Appendix Table II. Information Related to the Classification of Counties for Sampling and Grouping Purposes

State and County	1954 Commercialization Score	1954 Ratio of Pounds of Broilers Produced to Farm Chickens Produced (x/1.0)	Distance from Markets[1]	1954 Surplus (+) or Deficit (—) Status[2]			1950 Population
				Broilers	Farm Chickens	Total Chickens	
				Million Pounds	Million Pounds	Million Pounds	Thousand
New Hampshire:		1.2		+ 15.75	+17.94	+ 33.69	533
Belknap	42	1.3	Intermediate	+ .38	+ .47	+ .85	27
Carroll	58	3.3	Remote	+ 1.79	+ .47	+ 2.26	16
Cheshire	71	1.4	Intermediate	+ 2.41	+ 1.86	+ 4.27	39
Coos	7	0.1	Remote	— .76	— .18	— .94	36
Grafton	15	0.2	Remote	— .86	+ .71	— .15	48
Hillsboro	71	1.1	Intermediate	+ 3.09	+ 4.01	+ 7.10	157
Merrimack	51	0.6	Intermediate	+ 1.03	+ 3.14	+ 4.17	63
Rockingham	83	1.0	Intermediate	+ 5.98	+ 6.62	+ 12.60	70
Strafford	65	3.5	Intermediate	+ 2.55	+ .48	+ 3.03	52
Sullivan	36	1.1	Intermediate	+ .13	+ .35	+ .49	26

Vermont:		0.3		— 5.01	+ 5.85	+ .84	378
Addison	3	*	Remote	— .40	+ .56	+ .16	19
Bennington	11	0.2	Intermediate	— .41	+ .33	— .08	24
Caledonia	24	0.7	Remote	— .04	+ .42	+ .38	24
Chittenden	10	0.1	Remote	— 1.31	+ .31	— 1.00	63
Essex	1	0.0	Remote	— .14	+ .08	— .06	6
Franklin	0	0.0	Remote	— .66	— .05	— .71	30
Grand Isle	0	0.1	Remote	— .07	+ .02	— .05	3
Lamoille	29	0.7	Remote	+ .16	+ .45	+ .61	11
Orange	10	0.1	Remote	— .30	+ 1.10	+ .80	17
Orleans	10	0.1	Remote	— .44	+ .08	— .36	21
Rutland	11	0.3	Intermediate	— .86	+ .07	— .79	46
Washington	26	0.7	Remote	— .43	+ .31	— .12	43
Windham	43	0.7	Intermediate	+ .19	+ .87	+ 1.06	29
Windsor	28	0.3	Intermediate	— .31	+ 1.29	+ .98	41

Appendix Table II. Information Related to the Classification of Counties for Sampling and Grouping Purposes

State and County	1954 Commercialization Score	1954 Ratio of Pounds of Broilers Produced to Farm Chickens Produced (x/1.0)	Distance from Markets[1]	1954 Surplus (+) or Deficit (—) Status[2]			1950 Population
				Broilers	Farm Chickens	Total Chickens	
				Million Pounds	Million Pounds	Million Pounds	Thousand
Massachusetts:		2.2		— 44.96	—24.11	— 69.07	4,691
Barnstable	29	0.1	Intermediate	— .91	+ .43	— .48	47
Berkshire	30	0.9	Intermediate	— 2.16	— .64	— 2.80	133
Bristol	64	1.1	Contiguous	— 4.49	— .72	— 5.21	382
Dukes	30	0.5	Intermediate	— .07	+ .05	— .02	6
Essex	47	0.7	Contiguous	— 10.02	— 3.47	— 13.49	522
Franklin	53	3.8	Intermediate	+ 2.32	+ .34	+ 2.66	53
Hampden	86	10.9	Contiguous	+ 6.95	— 2.60	+ 4.35	368
Hampshire	57	2.4	Intermediate	+ 1.56	+ .49	+ 2.05	88
Middlesex	74	1.5	Contiguous	— 16.24	— 6.86	— 23.10	1,065
Nantucket	0	0.0	Intermediate	— .08	— .04	— .12	3
Norfolk	76	1.5	Contiguous	— 4.78	— 1.69	— 6.47	392
Plymouth	78	1.9	Contiguous	+ 2.63	+ 1.47	+ 4.10	189
Suffolk	63	2.2	Contiguous	— 19.57	— 9.66	— 29.23	897
Worcester	76	2.5	Contiguous	— .10	— 1.17	— 1.27	546

Connecticut:		3.3		+ 46.40	+ 5.56	+ 51.96	2,007
Fairfield	43	1.5	Contiguous	— 9.45	— 4.40	— 13.85	504
Hartford	62	1.2	Contiguous	— 6.78	— 1.59	— 8.37	540
Litchfield	36	1.2	Intermediate	†	+ .79	+ .79	99
Middlesex	61	0.6	Intermediate	+ .42	+ 2.49	+ 2.91	67
New Haven	58	1.6	Contiguous	— 7.73	— 3.26	— 10.99	546
New London	94	5.1	Intermediate	+ 25.23	+ 4.00	+ 29.23	145
Tolland	83	3.3	Intermediate	+ 9.97	+ 2.82	+ 12.79	45
Windham	99	6.7	Intermediate	+ 34.75	+ 4.70	+ 39.45	62
Rhode Island:		1.5		— 12.58	— 5.27	— 17.85	792
Bristol	31	0.8	Contiguous	— .52	— .17	— .69	29
Kent	49	1.1	Contiguous	— 1.09	— .29	— 1.38	78
Newport	10	0.1	Contiguous	— 1.31	— .42	— 1.73	62
Providence	54	0.8	Contiguous	— 11.06	— 4.35	— 15.41	575
Washington	63	5.1	Intermediate	+ 1.41	— .03	+ 1.38	49

1. The following definitions were used:

Contiguous: A county, the major share of which lies within 50 airline miles of Boston or New York; or a county in which is located one or more cities of 100,000 population or over; or a county, the major share of which lies within 20 airline miles of a city of 100,000 population or over.

Intermediate: Those counties immediately adjacent to counties classified as "contiguous"; or a county, the midpoint of which lies within 100 airline miles of Boston or 225 airline miles of New York; or a county in which is located a city of 50,000 population or over.

Remote: All other counties not included in the preceding categories.

2. Output in 1954 compared to requirements based on U. S. per capita production times 1950 area population. U. S. per capita data based on 1954 production and 1950 population.

* Less than 0.05.

† Less than 0.0005.

Appendix Table III. Adjusted Estimates: Number of Slaughtering Units in Sample Areas by Type and Proportions of Volume Slaughtered

Area	1950 Area Population	Total Units	Primary Type of Business			
			Producers	Poultry and Egg Stores	Processors	Others[1]
		Number		Number of units		
1	131,971	14	11	—	2	1
2	256,198	24	8	2	10	4
3	368,267	45	20	5	15	5
4	2,574,315	96	30	42	13	11
5	251,289	29	12	8	6	3
6	1,006,504	61	24	25	6	6
Total	4,588,544	269	105	82	52	30

Area	Estimated Slaughter	Primary Type of Business			
		Producers	Poultry and Egg Stores	Processors	Others[1]
	Pounds	Percent of area estimated slaughter			
1	282,200	78.0	—	20.2	1.8
2	115,596,591	0.1	0.1	99.7	0.1
3	32,568,385	1.1	0.5	98.1	0.3
4	46,253,465	2.2	2.8	92.4	2.6
5	64,659,249	0.4	0.3	99.2	0.1
6	36,106,758	2.6	3.3	92.0	2.1
Total	295,466,648	1.00	1.00	97.25	0.75

1. Live buyers, locker plants, retail food stores, restaurants, custom processors.

Appendix Table IV. Operations of Eviscerating Plants[1]: Volume, Number of Units, Market Classes, Supply Sources[2], and Market Outlets by Size of Operation

Size Group[3]	Total Eviscerated and cut-up	Units	Percent Distribution by Market Classes			
			Broilers and Fryers	Heavy Young Chickens	Fowl and Roosters	Total
	Thousand Pounds	Number				
1	414	15	64	25	11	100
2	1,445	5	71	5	24	100
3	5,375	3	77	15	8	100
Total	7,234	24	75	14	11	100

Size Group[3]	Percent Distribution by Types of Buyer			
	Consumers	Stores and Restaurants	Wholesale Receivers	Other Wholesale Outlets[4]
1	87	13	—	—
2	54	22	—	24
3	—	4	19	77
Total	16	7	14	63

1. Non-slaughtering plants, plus a few slaughtering plants which purchase supplementary supplies in New York dressed form.

2. Practically 100 percent of birds bought as New York dressed were obtained from slaughterers. Hence, details by supply sources not shown.

3. Size group 1: Less than 100,000 pounds dressed weight annually. Size group 2: 100,000-525,000 pounds dressed weight annually. Size group 3: Over 1,000,000 pounds dressed weight annually.

4. Chain warehouses, packer branches, jobbers, hotel and institutional supply houses.

Appendix Table V. Some Derived Performance Rates[1] for Very Small Poultry Processing Units Operating for Very Short Periods

Function Included:	Number of Birds per Man-Hour
New York Dressing:	
1. Hang, kill, scald, pick, pin, weigh, cool, pack, ice, accumulate, load-out, clean-up, miscellaneous	10[2]
2. Hang, kill, scald, pick, pin, weigh, cool, pack, ice	12
3. Hang, kill, scald, pick, pin, weigh, cool	20
4. Hang, kill, scald, pick	36[3]
5. Pick	60
6. Hang, kill, scald, pick, pin, weigh, cool, pack, ice, accumulate, wait on customers, clean-up (some eviscerating)	2.5-6.0
Eviscerating:	
7. Draw and/or cut-up, weigh, wash, individually pack, freeze, accumulate, load-out, clean-up	6.0
8. New York dress, draw and/or cut-up, weigh, cool, pack, ice, accumulate, load-out, clean-up	7.5
9. New York dress, draw and/or cut-up, weigh, cool, pack, ice	8.5
10. New York dress, draw and/or cut-up, weigh, cool	11.5
11. Draw and/or cut-up, some cooling	27.0

1. Not including overall managerial and office functions. Figures shown are for units operating 1-2 hours at a time, and change between the extremes as length of work period and number of people increase. Data from which figures obtained not always precise as to function included. Data cannot be expanded by multiplication by volume.

2. Miscellaneous duties might include ice crushing, box and liner readying, moving crates, batteries, etc. Clean-up time is likely to remain fairly constant, accumulating and loading to increase at a decreasing rate, miscellaneous tasks to be somewhat proportionate to volume.

3. On a one-picker operation, employee hanging, killing, and operating scalder is likely to have some time for miscellaneous duties. These might involve ice crushing, box and liner readying, moving crates and batteries, etc. With 2 or more people picking, such employee (s) would be occupied full time at tasks listed.

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